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~~AN 16-30CRW7-13~~

HANDBOOK
MAINTENANCE INSTRUCTIONS

RADIO RECEIVING SET AN/CRW-7

THIS PUBLICATION REPLACES AN 16-30CRW7-2M DATED 10 JULY 1945.

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AND THE CHIEF OF THE BUREAU OF AERONAUTICS

J. P. Eau Claire, Wis., 1900, 9-4-51

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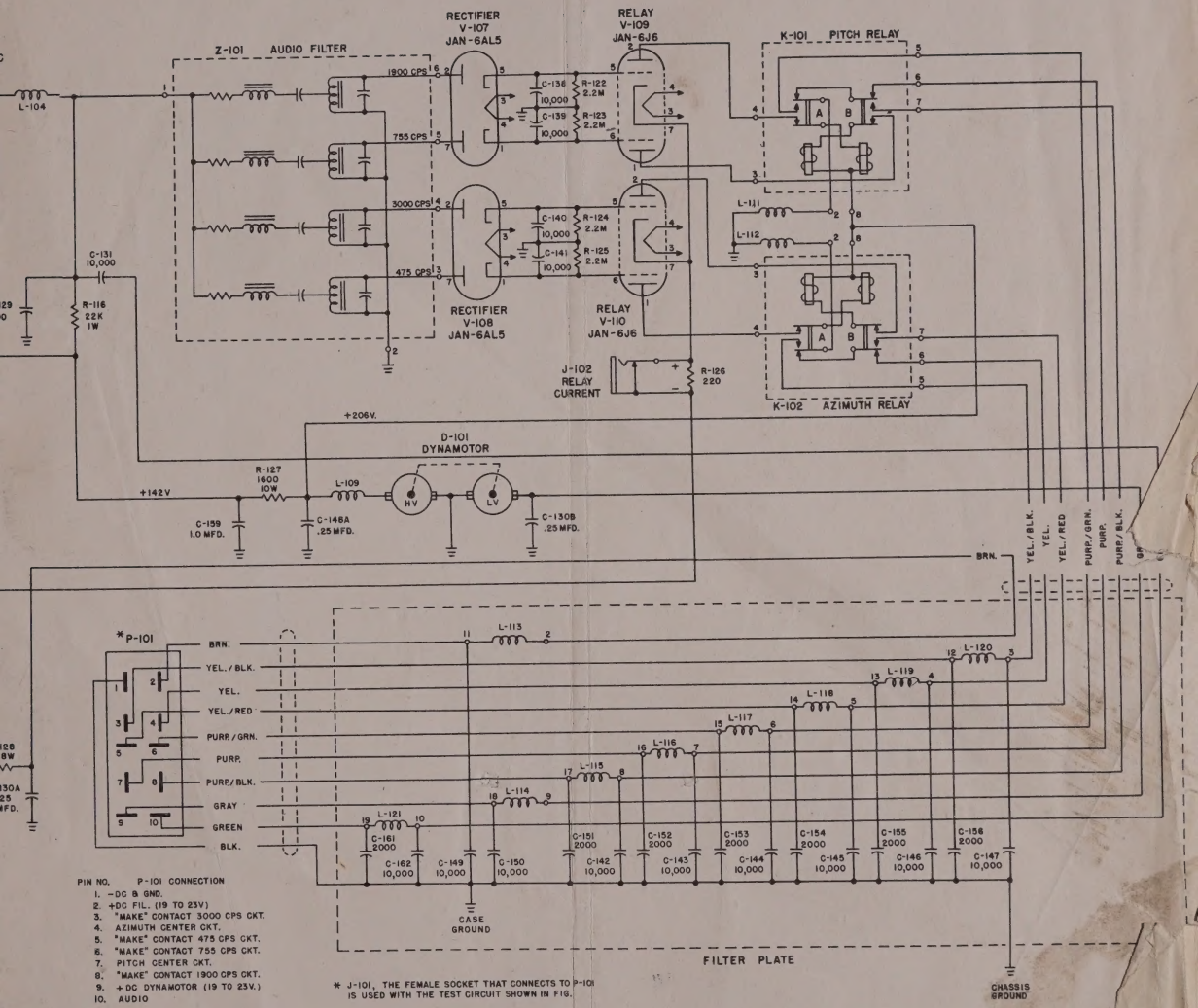

PIN NO. P-101 CONNECTION

1. -DC & GND.
2. +DC FIL. (19 TO 23V.)
3. "MAKE" CONTACT 3000 CPS CKT.
4. AZIMUTH CENTER CKT.
5. "MAKE" CONTACT 475 CPS CKT.
6. "MAKE" CONTACT 755 CPS CKT.
7. PITCH CENTER CKT.
8. "MAKE" CONTACT 1900 CPS CKT.
9. +DC DYNAMOTOR (19 TO 23V.)
10. AUDIO

* J-101, THE FEMALE SOCKET THAT CONNECTS TO P-101 IS USED WITH THE TEST CIRCUIT SHOWN IN FIG.

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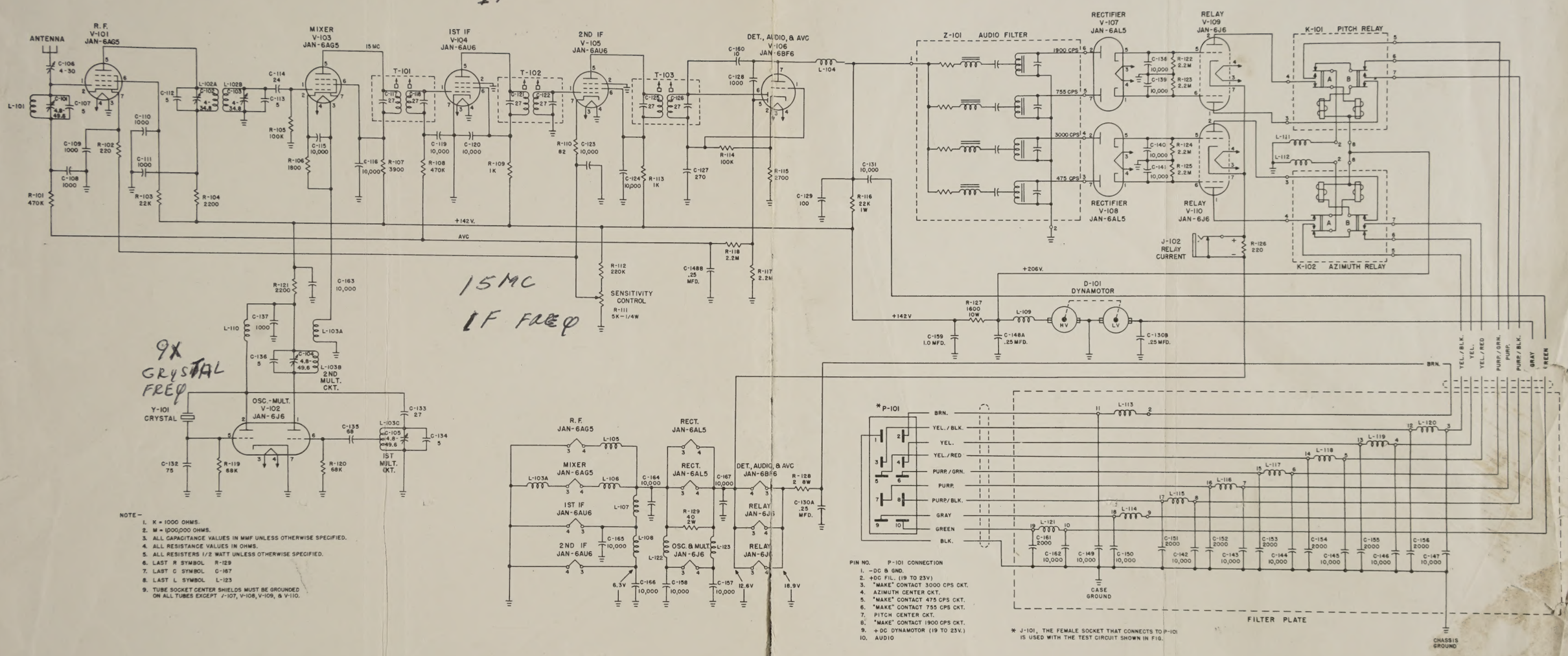

NOTE—

1. K = 1000 OHMS.
2. M = 1000,000 OHMS.
3. ALL CAPACITANCE VALUES IN MMF UNLESS OTHERWISE SPECIFIED.
4. ALL RESISTANCE VALUES IN OHMS.
5. ALL RESISTERS 1/2 WATT UNLESS OTHERWISE SPECIFIED.
6. LAST R SYMBOL R-129
7. LAST C SYMBOL C-167
8. LAST L SYMBOL L-123
9. TUBE SOCKET CENTER SHIELDS MUST BE GROUNDED ON ALL TUBES EXCEPT V-107, V-108, V-109, & V-110.

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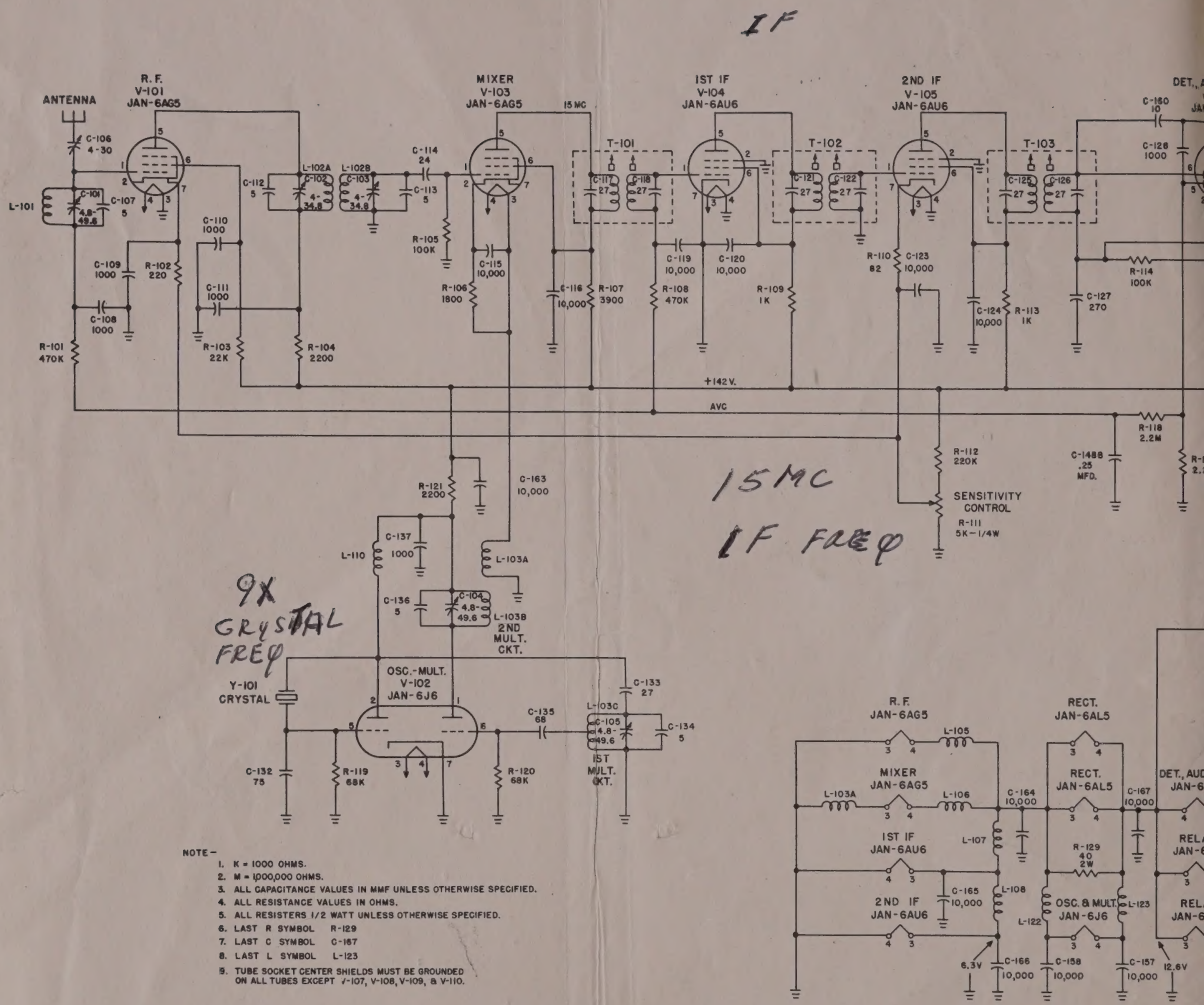
Figure 8-9. Radio Receiver R-150A/CRW-7 - Complete Schematic Diagram



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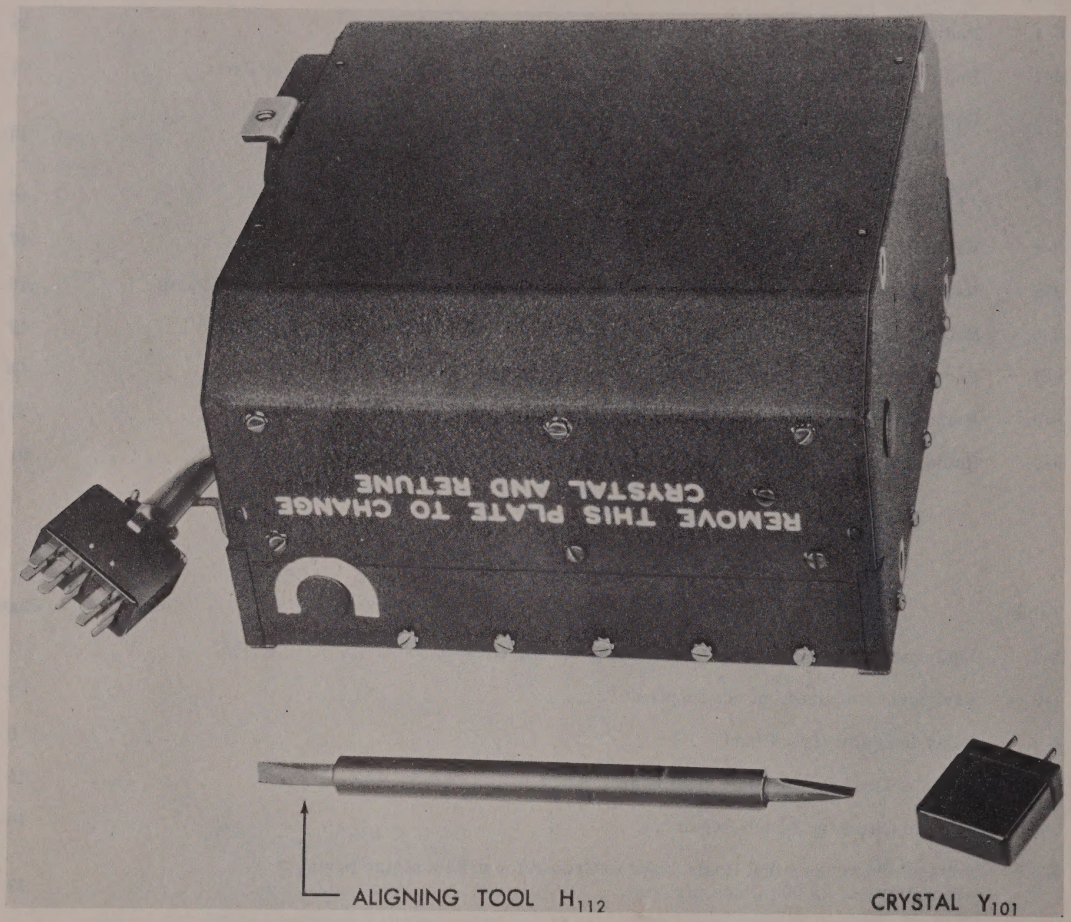


Figure 1-1. Radio Receiving Set AN/CRW-7

SECTION I

GENERAL DESCRIPTION

1-1. GENERAL

1-2. Radio Receiving Set AN/CRW-7 (See figure 1-1) is the receiving unit of a remote control radio system which uses Radio Transmitting Equipment RC-186 or equivalent and related components. When properly installed in associated equipment, the radio receiving set controls functioning of that equipment through signals from the transmitter.

1-3. OPERATING FREQUENCY. Radio Receiving Set AN/CRW-7 receives radio frequency signals from 65.94 megacycles to 92.95 megacycles. Frequency of the high frequency oscillator is determined by a plug-in crystal. This frequency is indicated by a frequency designating code stamped on the crystal holder and on the case of the radio receiving set. The set operates on an intermediate frequency of 15 megacycles. Audio frequency selector filters for nominal response frequencies operate at 475, 755, 1900 and 3000 cycles per second. Simultaneous operation is provided on signal combinations of 475 and 755 cycles, 1900 and 475 cycles, 1900 and 3000 cycles per second or 755 and 3000 cycles per second.

1-4. PERFORMANCE LIMITING FACTORS. Radio Receiving set AN/CRW-7 is designed to operate continuously in temperatures ranging from a -55° C (-67° F) to a + 55° C (+131° F). In operation, the set is capable of withstanding temperatures of +71° C (160° F) for 30 minutes, provided there is a compensating temperature stabilizing period that will cool it off. Above 15,000 feet altitude, the highest temperature at which the set should be operated is +30° C (+86° F). Operation is possible at relative humidity ranging up to 100 percent, at temperatures up to 50° C (122° F).

1-5. POWER REQUIREMENTS. Radio Receiving Set AN/CRW-7 requires a direct current source of 21 volts plus or minus two volts at three amperes, or approximately 60 watts. An internal dynamotor operated from the primary voltage supplies the high voltage necessary.

1-6. EQUIPMENT SUPPLIED. (See table 1-1).

TABLE 1-1. EQUIPMENT SUPPLIED WITH RADIO RECEIVING SET AN/CRW-7.

Quantity per Equipment	Name of Unit	AN Type Designation	Overall Dimensions (Inches)	Weight (Pounds)
1	Radio Receiver. This includes tubes installed in the sockets and an aligning tool. Does not include crystal unit.	R-150A/CRW-7	8-1/2 x 8 x 4-1/2	15
1	Crystal Unit	CR-1A/AR Modified		
1	Connector, Female	J-101		
1	Alignment Tool		7/16 OD x 7	

1-7. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

a. Radio Transmitting Equipment RC-186 or equivalent and related equipment.

b. A power source consisting of a battery, or the equivalent, to supply 21 volts direct-current plus or minus two volts at three amperes.

1-8. TEST EQUIPMENT REQUIRED. Refer to table 1-2 for a list of test equipment required.

1-9. DESCRIPTION.

1-10. Radio Receiving Set AN/CRW-7 functions as an ordinary superheterodyne receiver to amplify and demodulate the audio frequency from the received radio-frequency signal. Each of the four predetermined audio frequencies is applied to half of a dual-diode rectifier tube. Each diode unit in turn operates one amplifier relay tube. Each amplifier unit in turn operates a relay, which activates a mechanical control in the associated equipment. This makes mechanical control of the associated equipment possible through the transmitter. The unit is completely housed in a metal case 8-1/2 x 8 x 4-1/2 inches and weighs 15 pounds.

1-11. The following adjustments are accessible by removing the metal plate on the front of the case: (Refer to figure 1-2).

a. First Multiplier
b. Second Multiplier
c. Mixer Grid adjustment.
d. Radio Frequency Plate Adjustment.
e. Radio Frequency Grid Adjustment.

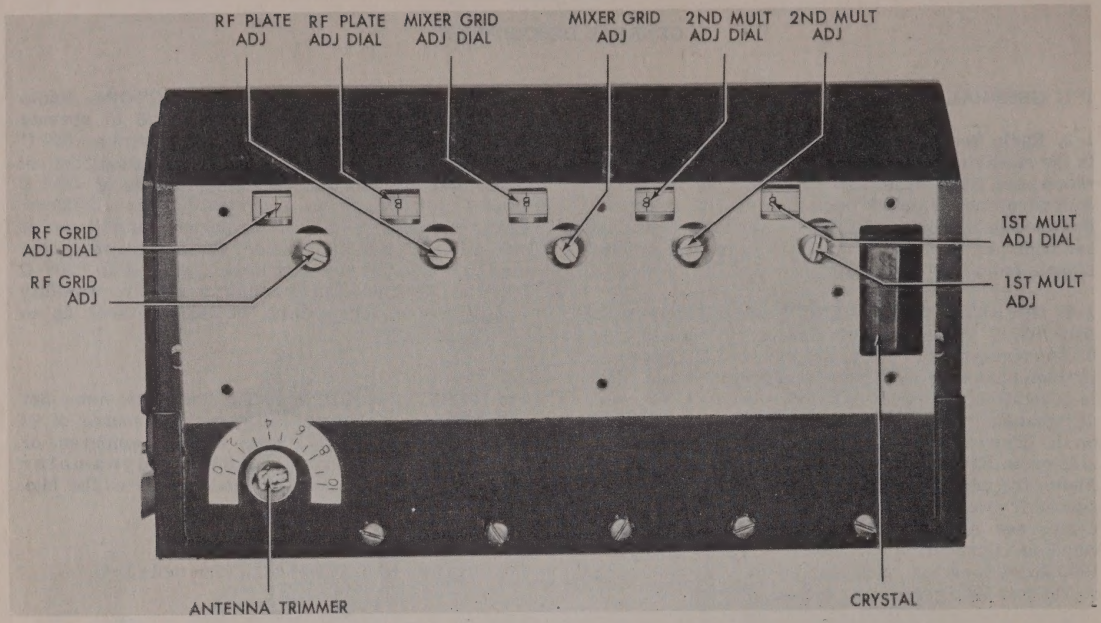


Figure 1-2. Radio Receiving Set AN/CRW-7 - Front View.

The approximate setting of these controls is determined by letters "A" through "E" on the tuning dials, visible through small windows in the case. An opening also is provided on the front of the case for insertion or removal of the crystal.

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

Quantity per Equipment	Name of Unit	AN Type Designation	Required Characteristic
1	Radio Set	AN/ARW-9	
1	Tube Tester	I-177	
1	Test Set	TS-297/U	
1	Oscilloscope	OS-8/U	
1	Test Oscillator	TS-326A/U	
1	Relay Test Set	TS-604/U	
1	Multimeter	TS-352/U	
1	Signal Generator	TS-452/U	
1	Voltmeter	TS-375/U	
1	Dynamotor Test Set	TS-414/U	
1	Plug	PL-55	
1	Antenna	A-85-A or equivalent	
1	Battery or equivalent power supply.		26.5 volts dc

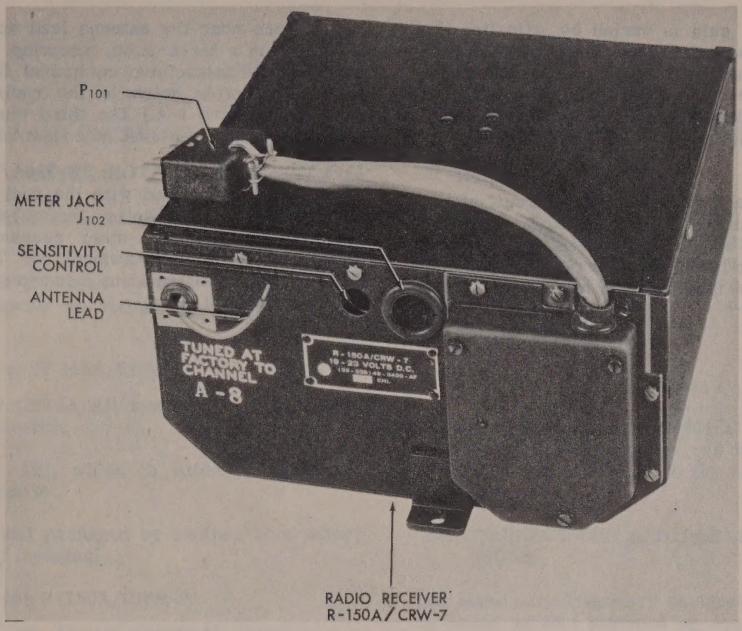


Figure 1-3. Radio Receiving Set AN/CRW-7 - Left Side View

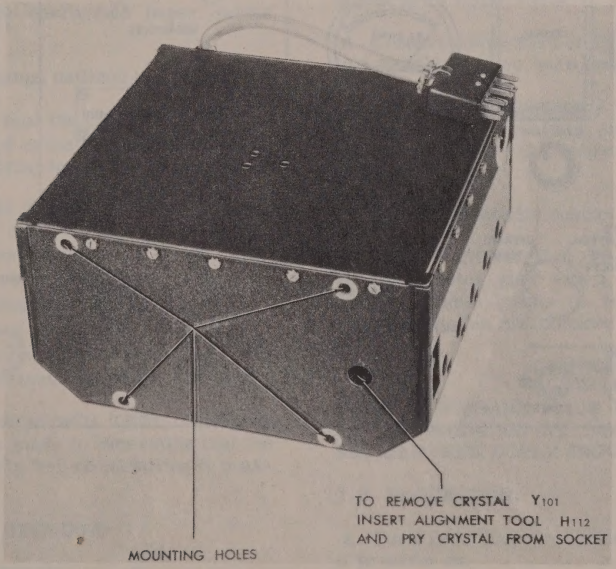


Figure 1-4. Radio Receiving Set AN/CRW-7 - Right Side View.

1-12. The receiver gain is varied by adjusting the sensitivity of the radio-frequency and second intermediate-frequency stages through an opening in the left side. (See figure 1-3.) A ten-terminal power plug (See figure 1-3) makes all input and output connections necessary to the power supply and to the associated equipment.

1-13. A metering jack in the cathode circuit of the relay tubes (See figure 1-3) is provided to check the output necessary to operate the relays. The antenna lead is located at the lower right corner on the same side. A frequency designating code is stamped on the flat surface near the antenna lead wire. The set is installed on a three-point mounting. Two mounting posts on the associated equipment fit into corresponding mounting holes in the radio receiving set case. (See figure 1-4.) The third mounting is made with the mounting bracket (See figure 1-3.)

1-14. TEST OSCILLATOR TS-326A/U. Test Oscillator TS-326A/U, used with the radio receiving set, consists of a test oscillator, test crystals, miniature radiating antenna, and other necessary cables and fittings. Refer to the handbook for Test Oscillator TS-326A/U for instructions concerning the operation of this equipment.

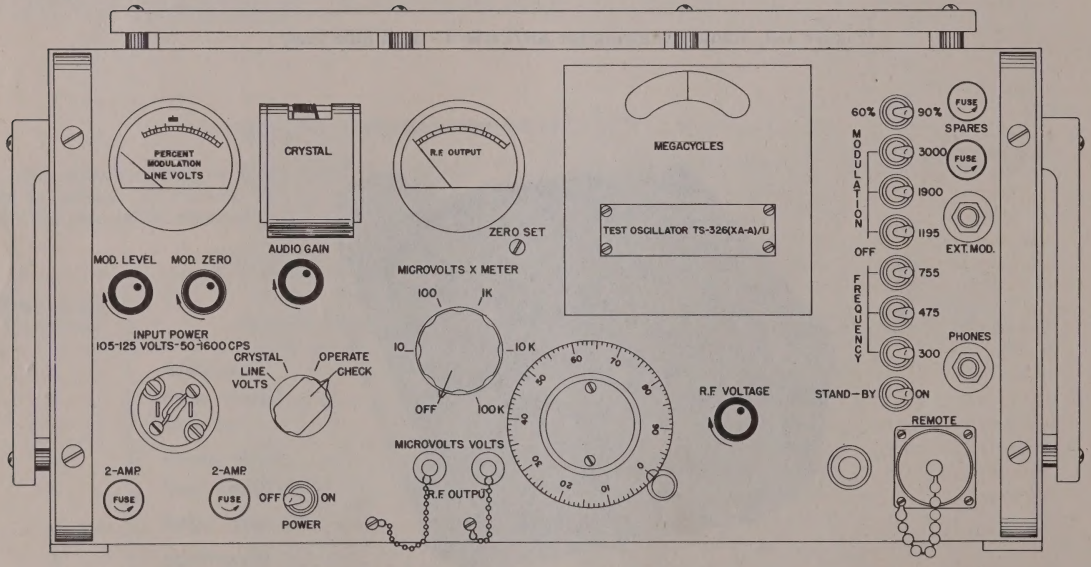


Figure 1-5. Test Oscillator TS-326A/U - Front Panel View.

SECTION II

INSTALLATION AND ADJUSTMENT

2-1. UNPACKING AND UNCRATING

2-2. PACKAGE CONTENTS. The radio receiver is packaged in accordance with the particular contract and shipping instructions in either of the following manners:

a. Supplied and packaged by one contractor as a complete set, Radio Receiving Set AN/CRW-7 includes:

1 Radio Receiver R-150A/CRW-7.

1 Crystal Unit CR-1A/AR modified, which is installed in the receiver.

1 Connector J-101, which is fitted to connector P-101 of the receiver.

b. Or supplied and packaged by another contractor; the receiving set includes:

1. Radio Receiver R-150A/CRW-7.

1 Crystal Unit CR-1A/AR modified, which is installed when supplied by the contracting agency.

2-3. UNCRATING. Procedure to be followed in uncrating the receiver will depend on whether it has been packed for domestic or overseas shipment:

a. DOMESTIC. Open the corrugated paper carton and remove the unit.

b. OVERSEAS. Follow steps outlined below:

1. Cut steel straps that bind the crate.
2. Remove wooden lid of crate by pulling out nails with a nail puller. Attempting to pry off lid may damage set.
3. Cut sealed vaporproof bag with a knife or other sharp instrument.
4. Open corrugated paper carton.
5. Open second vaporproof barrier.
6. Open second corrugated paper carton.
7. Remove the two bags of silica gel.
8. Remove air cell pads from top of unit.
9. Remove unit and operational manual.

2-4. PRE-INSTALLATION BENCH TEST. The pre-installation bench test is made to determine that the set is functioning properly before installing it in associated equipment.

2-5. TEST EQUIPMENT REQUIRED

a. Test Oscillator TS-326A/U.

b. Direct-Current source of 26.5 volts.

c. Test meter TS-297/U or TS-352/U.

d. Relay test set TS-604/U.

2-6. The relay test set TS-604/U provides an instantaneous visible means of checking the relay action of the set. Refer to the handbook for relay test set TS-604/U for operating instructions for this equipment. For a schematic diagram of Relay Set TS-604/U refer to figure 8-8.

Note

If the relay test set TS-604/U is not available checks of relay closing can be made with an ohmmeter connected to the terminals of the power plug.

2-7. CONNECTIONS AND PRELIMINARY PRECAUTIONS.

a. Make sure frequency designating code on crystal is same as that stamped on receiver, and that it is the channel established for the transmitter.

b. Connect connector P-101 of receiver to relay test set TS-604/U.

c. Connect to a direct-current power source and adjust to 19 volts.

d. Connect power cord of Test Oscillator TS-326A/U to a suitable source; turn power switch on.

e. Connect radio-frequency "OUTPUT" of test set to antenna lead of receiving set with cables provided. The ground lead of the output cable is to be grounded to the case.

f. Set the sensitivity control to maximum.

g. Connect TS-297/U or TS-352/U test meter to the receiver meter jack with a plug PL-55 and cord. (This provides means of reading relay current.) Switch to the ten milliampere scale.

CAUTION

WHEN TESTS ARE MADE USING TWO MODULATING FREQUENCIES AT THE SAME TIME THE 50 MILLIAMPERE SCALE SHOULD BE USED.

2-8. PROCEDURE:

a. Turn receiving set on and allow five minutes for it to warm up.

b. Set the power switch on Relay Test Set TS-604/U to "ON".

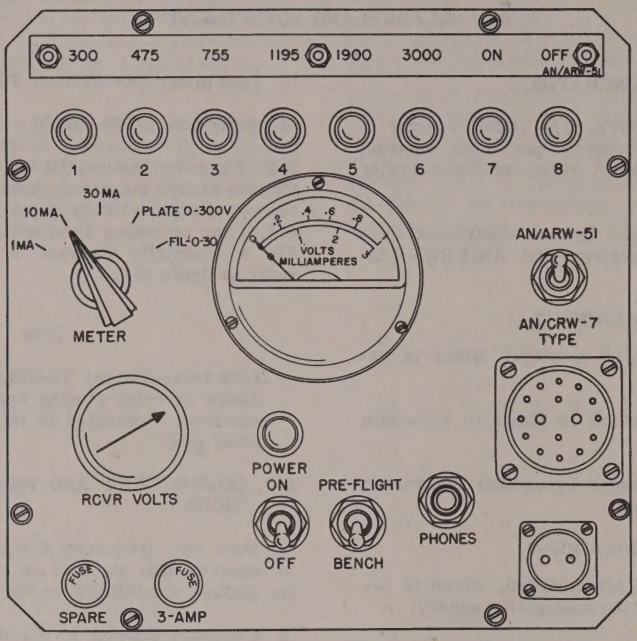


Figure 2-1. Relay Test Set TS-604/U - Front Panel View

TABLE 2-1. RELAY INDICATOR TEST CHART

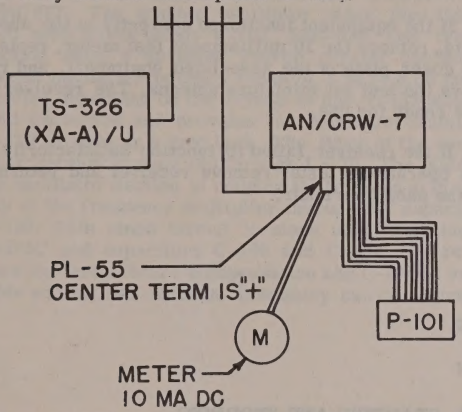
Test Modulating Frequency (cps)	Relay Indicator Lights						Relay Current Ma
	475 cps (Light #2)	AZIMUTH Center (Light #4)	3000 cps (Light #6)	755 cps (Light #3)	PITCH Center (Light #7)	1900 cps (Light #5)	
None		On			On		Less than 0.2
475	On				On		7 or more
3000			On		On		7 or more
755		On		On			7 or more
1900		On				On	7 or more
475 & 755	On			On			Approx. 10 or more
475 & 1900	On					On	Approx. 10 or more
3000 & 755			On	On			Approx. 10 or more
3000 & 1900			On			On	Approx. 10 or more

c. Install correct check crystal in test oscillator. This will have same channel frequency designating code as receiver crystal, but with addition of letter "T".

d. Tune test oscillator to exact channel frequency by means of built-in crystal oscillator. If not familiar with operation of Test Oscillator TS-326A/U, refer to the handbook for TS326A/U.

e. Adjust test oscillator for 54 percent modulation and 50 microvolts output.

f. Turn on audio frequency modulating tones of test oscillator singly and in pairs as indicated in Table 2-1. Observe relay current and test lights for each frequency channel test, and make sure light operation and relay current corresponds to table.



PIN NO.	P-101 CONNECTION	PIN NO.	P-101 CONNECTION
1.	-DC & GND.	6.	"MAKE" CONTACT 755 CPS CKT.
2.	+DC FIL. (19 TO 23V.)	7.	PITCH CENTER CKT.
3.	"MAKE" CONTACT 3000 CPS CKT.	8.	"MAKE" CONTACT 1900 CPS CKT.
4.	AZIMUTH CENTER CKT.	9.	+DC DYNAMOTOR (19 TO 23V.)
5.	"MAKE" CONTACT 475 CPS CKT.	10.	AUDIO.

Figure 2-2. Circuit Connections Using the Test Oscillator with Receiver Installed in Associated Equipment.

2-9. RELAY INDICATOR TEST CHART. Used correctly, Table 2-1 will indicate whether relays are operating, either singly or in pairs. Unless lights are indicated ON in the chart, they should be off. The power light remains on throughout the test. Center lights remain on where indicated. In transition between left and right and up and down, center lights will flash on as switch crosses center position.

2-10. ANTENNA TRIMMER ADJUSTMENT. If the relay current of the receiver is less than that shown in Table 2-1, a slight adjustment of the antenna trimmer control and radio frequency grid adjustment may be necessary. These trimmers are shown in figure 1-2. The adjustment is made as follows:

a. The 475 cycles per second modulation frequency of the test set is turned on, all other modulating frequencies turned off.

b. Turn the antenna trimmer slightly to right or left, leaving it at the position which shows the greatest deflection on the milliammeter.

c. Turn the radio frequency grid adjustment either right or left to whichever position shows greatest deflection on the milliammeter.

d. Repeat trimmer adjustments until a maximum reading is obtained. It must be at least seven milliamperes relay current.

e. Recheck single channel and dual channel responses as shown in Table 2-1. If the receiver passes the tests, it is ready for installation. If it still does not pass the tests, it should be returned to the shop for repair.

2-11. INSTALLATION.

a. Remove cover plate from associated equipment housing, to gain access to the compartment which holds Radio Receiving Set AN/CRW-7.

b. Make sure the compartment is clear of other objects.

c. Insert the set gently into the compartment until the mounting posts have entered the mounting holes. (When the mounting posts are in proper position the bolt hole in the mounting bracket will be directly over the bolt hole in the associated equipment).

d. Insert the bolt through the bolt hole in the mounting bracket and through the corresponding hole in the associated equipment. Make sure associated equipment is free of paint under the bolt, so that good ground contact is established. Tighten securely using lock washers.

e. Connect power connection P-101 of the receiver to mating connector J-101 which has been wired to the associated equipment.

f. Connect antenna lead to antenna binding post provided in associated equipment.

2-12. CABLES. All power and relay control connections from the associated equipment to Radio Receiver R-150A/CRW-7, of Radio Receiving Set AN/CRW-7 are made through connector P-101 which is permanently attached to the receiver at the factory by means of a short ten-wire cable. Mating connector J-101 is likewise permanently attached to the associated equipment. Circuit connections of the connector are shown in figure 2-2. The only other connection to the receiver is the antenna lead wire which connects to the antenna binding post of the associated equipment.

2-13. AFTER-INSTALLATION TEST AND ADJUST-

MENTS. The following procedure gives the operational test of Radio Receiving Set AN/CRW-7.

a. Make sure that the radio receiving set is installed in associated equipment in accordance with the paragraph on installation (paragraph 2-11) and that all connections are properly made.

b. Set up the test oscillator as described in the Operational Manual for Test Oscillator TS-326A/U.

c. Couple radio-frequency output of Test Oscillator TS-326A/U to the antenna of the associated equipment with the proper jig provided with the test set. (The proper jig will be indicated in Test Oscillator TS-326A/U instructions).

d. Plug in proper crystal and adjust test oscillator to the operating frequency indicated by the frequency designating code stamped on the radio receiving set case.

e. Attach the 0-10 milliammeter to the meter jack in Radio Receiving Set AN/CRW-7.

f. Connect primary voltage from battery or generator to associated equipment and adjust to 21 volts.

g. Adjust Test Oscillator TS-326A/U for an output of from 50 to 100 microvolts in accordance with the instruction book for Test Oscillator TS-326A/U. This output setting may vary with the type of antenna installation used.

h. Check adjustment of antenna trimmer and radio frequency grid (paragraph 2-10).

i. See that all channels of Radio Receiving Set AN/CRW-7 function properly by checking all applicable mechanical movements of associated equipment. Table 2-1 may be used as a guide in making these checks except that in this case mechanical movement of the equipment will be the indicator of operation rather than the light bulb indicator. Check each of the modulation frequencies required by the associated equipment.

j. If the equipment functioned correctly in the above tests, remove the 10 milliampere test meter, replace the cover plate of the associated equipment, and remove the test set miniature antenna. The receiver is now ready for use.

k. If the receiver failed to function satisfactorily in the operational tests, remove receiver and return it to the shop for repair.

SECTION III

OPERATION

3-1. GENERAL.

3-2. Functions of Radio Receiving Set AN/CRW-7 are controlled by signals radiated from Radio Transmitting Equipment RC-186. The nature of the radiated signals is determined by the setting of Control Box BC-1156, which is manipulated by the transmitter operator, who thus controls response of the receiver.

3-3. STARTING AND STOPPING.

3-4. With the receiver installed, starting and stopping is automatic in that both functions are performed by controls in the associated equipment. For starting and stopping instructions, see the operator's manual on associated equipment.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL.

4-2. Radio Receiving Set AN/CRW-7 is the receiving unit of a radio remote control system. Its general purpose is to receive and transform radio-frequency energy into mechanical energy. This is accomplished through use of an ordinary high frequency receiver followed by a network of filters which separate and route the modulated impulses to their pre-determined channels.

4-3. The radio-frequency signal received on the antenna of the associated equipment is amplified by the radio-frequency amplifier tube V-101 (JAN-6AG5) and then fed into the mixer stage. See figure 4-1. The radio-frequency signal is mixed with the output of the local oscillator section. The local oscillator section consists of a crystal oscillator stage followed by a frequency multiplier stage that multiplies the frequency nine times. Two stages of intermediate-frequency amplification are employed to further amplify

the signal. A duo-diode triode is used as a detector, for automatic volume control and as an audio amplifier. Automatic volume control is applied to the radio frequency stage and to the first intermediate frequency stage. Following the detector stage is a selective filter network. The four secondaries of this network respond to the audio frequencies of 475, 755, 1900 and 3000 cycles per second. These audio voltages are fed into half wave rectifiers and the output from the rectifiers is fed into triode amplifiers. Relays in each of these triode amplifiers will close electrical circuits which will cause mechanical parts of associated equipment to be electrically moved.

4-4. DETAILED FUNCTIONING OF RADIO RECEIVER R-150A/CRW-7.

4-5. OSCILLATOR AND FREQUENCY MULTIPLIER CIRCUIT. The master oscillator stage (See figure 4-2) uses a twin triode V-102, JAN-6J6. One triode section uses a modified Pierce crystal oscillator circuit having a frequency range of 5.66 to 8.65 megacycles depending on the crystal in use. C-132 affects grid excitation and provides for maximum stability. R-119 is used as a grid leak. The Plate of the oscillator section is shunt fed through L-110. The plate of the oscillator section is coupled to the tuned grid circuit of the frequency multiplier through the capacitor C-133. This tuned circuit is made up of inductance L-103C and capacitors C-105 and C-134. C-134 is used for temperature compensation and C-105 is variable so that the resonant frequency can be adjusted in its range of 16.98 to 25.95 megacycles (third harmonic of the crystal frequency). C-135 couples the tuned circuit to the grid with R-120 acting as a grid leak. The plate of the frequency multiplier is coupled to a tuned circuit composed of L-103B, C-104 and C-136. C-136 is used for temperature compensation. C-104 is variable so that the resonant frequency can be adjusted over the range 50.94 to 77.85 megacycles (nine times the crystal frequency or the third harmonic of the multiplier grid input frequency). Both triode sections receive their plate voltages through the dropping resistor R-121. C-163 acts as a radio-frequency bypass. Radio-frequency voltage for the mixer is obtained by inductive coupling between L-103A and L-103B.

4-6. RADIO-FREQUENCY AMPLIFIER CIRCUIT. This circuit uses tube V-101 (JAN-6AG5) as a preselector amplifier. (See figure 4-3). A series trimmer capacitor, C-106, between the antenna and the grid of this stage makes it possible to use a number of different antennas. Both the grid and plate circuit are tuned to the incoming frequency. The tuned grid circuit is made up of inductor L-101, tuning capacitor C-101 and temperature compensated capacitor C-107. C-101 is the RADIO FREQUENCY GRID ADJUSTMENT (See figure 1-2) which enables this circuit to cover the frequency range 65.94 to 92.85 megacycles. R-101 is the automatic volume control coupling resistor bypassed to ground by C-108. R-102 is the cathode bias resistor, one end of which is connected to the sensitivity control and is bypassed to ground by

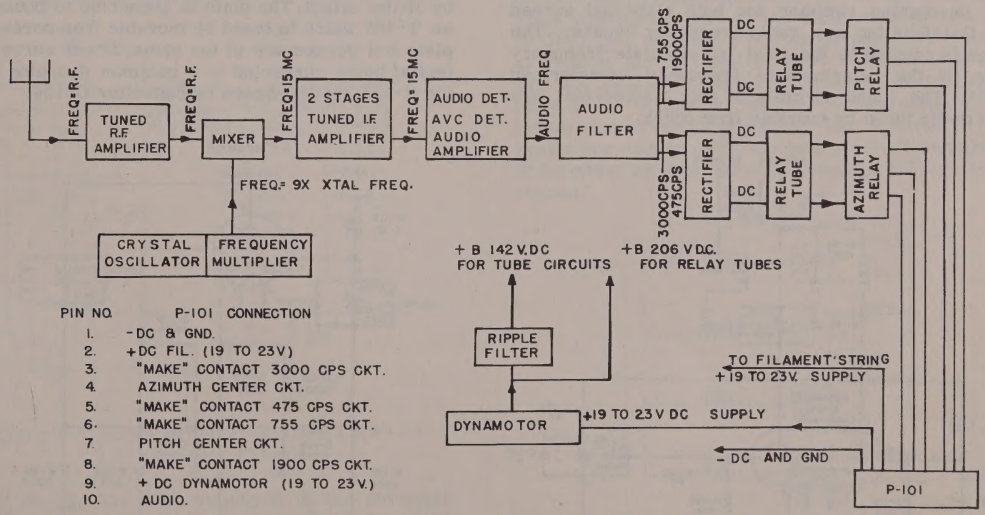


Figure 4-1. Radio Receiver R-150A/CRW-7 - Block diagram.

C-109. The plate is coupled to a tuned circuit composed of inductor L-102A, tuning capacitor C-102 and temperature compensated capacitor C-112. C-102 is the RADIO FREQUENCY PLATE ADJUSTMENT (See figure 1-2) used to vary the resonant frequency of this circuit over the same range as the input circuit. R-104 is used as a decoupling resistor in the plate voltage lead and is bypassed by C-111. C-110 and R-103 form a decoupling network in the screen circuit.

4-7. MIXER CIRCUIT. This circuit uses tube V-103 (JAN-6AG5). (See figure 4-4). L-102A and L-102B are coupled inductively to provide energy transfer between the radio frequency amplifier and the input of the mixer. Inductor L-102B, tuning capacitor C-103 and temperature compensating capacitor C-113 form the resonant circuit in the grid input. C-103 is the MIXER GRID ADJUSTMENT (See figure 1-2 used to vary the input frequency over the desired range. The output of the oscillator section, tube V-102, is coupled to the mixer through C-115 (cathode injection). R-106 is used as a cathode bias resistor. R-105 is used as a grid leak bias resistor while C-114 is used as a coupling capacitor. Note that the filament ground return is through the coil L-103A placing the filament at the same radio-frequency potential as the cathode. L-106 is placed in the other filament lead to insure a high impedance to radio-frequency. Since both filament and cathode are at the same radio-frequency potential, it eliminates the loading effect of the cathode to filament capacitance which would occur if the filament were at ground potential. The plate is tuned to an intermediate frequency of 15 megacycles. The frequency appearing at the plate is the difference between the radio-frequency and the oscillator harmonic with the oscillator frequency in this case being lower than the input frequency. R-107 acts as a common decoupling resistor for both plate and screen with C-116 acting as a radio-frequency bypass. The mixer is coupled to the first intermediate-frequency stage by the intermediate-frequency transformer T-101. The tuned circuits of this transformer are inductively tuned by movable iron cores.

4-8. FIRST INTERMEDIATE FREQUENCY AMPLIFIER. This amplifier stage uses tube V-104 (JAN-6AU6). (See figure 4-5). The gain of this stage is controlled by automatic volume control. The screen grid and the plate are at the same direct current potential with R-109 as a common decoupling resistor in the positive lead. C-120 acts as a common radio-frequency bypass. The input of this stage is inductively coupled to the mixer circuit by transformer T-101. R-108 is the automatic volume control coupling and C-119 is the radio-frequency bypass. The output of this stage is inductively coupled to the input of the second intermediate-frequency stage by means of the transformer T-102 which is tuned by movable iron cores.

4-9. SECOND INTERMEDIATE-FREQUENCY AMPLIFIER. This amplifier uses tube V-105 (JAN-6AU6). (See figure 4-5). The input of this stage is inductively coupled to the output of the first intermediate-frequency amplifier by transformer T-102. No automatic volume control is applied to this stage. R-110 is a cathode bias resistor, R-110 is not returned to ground in the usual manner of cathode bias resistors but is connected to the arm of a potentiometer, R-111, the SENSITIVITY CONTROL, (See figure 1-1) which together with R-112, form a voltage dividing network. R-111 and R-112 are in series between B+ and ground. By moving the arm on R-111, the bias voltage applied to V-105 and V-101 can be varied which acts effectively to control the gain of these two stages and the receiver, C-123 is used as a cathode bypass condensor. It is connected from the sensitivity control rather than from the cathode of V-105 to add degeneration to this stage. This compensates for any detuning of the intermediate-frequency stages caused by Miller effect. The plate is connected to transformer T-103 which is tuned by movable iron cores. Both plate and screen are at the same direct current potential being connected to a common dropping resistor R-113 and by passed by capacitor C-124.

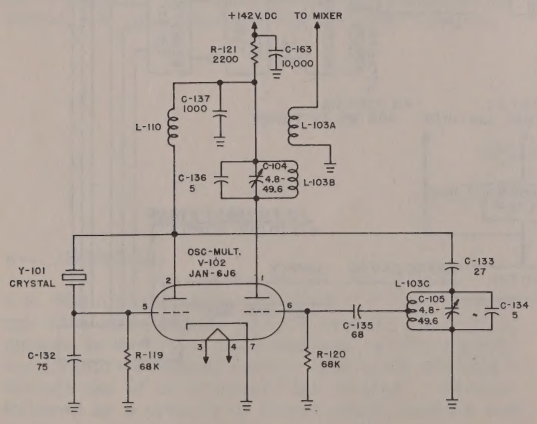


Figure 4-2. Radio Receiver R-150A/CRW-7 - Oscillator and Frequency Multiplier Circuit.

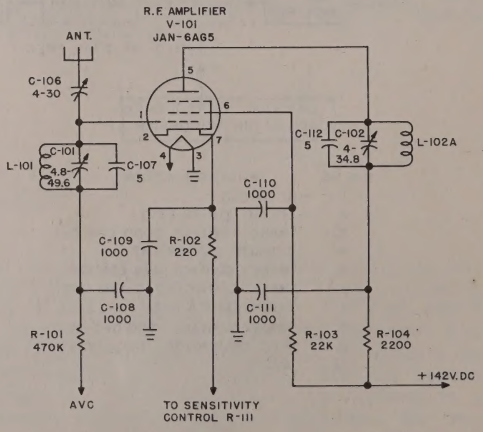


Figure 4-3. Radio Receiver R-150A/CRW-7 - Radio-Frequency Amplifier Circuit.

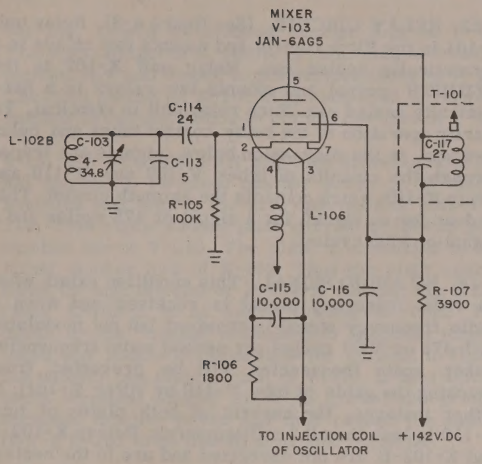


Figure 4-4. Radio Receiver R-150A/CRW-7 - Mixer Circuit

4-10. DETECTOR, AUTOMATIC VOLUME CONTROL AND AUDIO AMPLIFIER. This stage uses tube V-106 (JAN-6BF6). (See figure 4-6) a duo-diode triode. A conventional diode detector is employed using plate pin number six. R-114 is used as the diode load resistor. C-127 filters the radio-frequency from the output of the detector stage. The triode section forms a class A audio amplifier working into a load consisting of Z-101 and R-116. C-129 is used as a radio-frequency bypass across the audio load. The audio voltage developed across R-116 is coupled through C-131 to pin number ten of P-101 for test purposes.

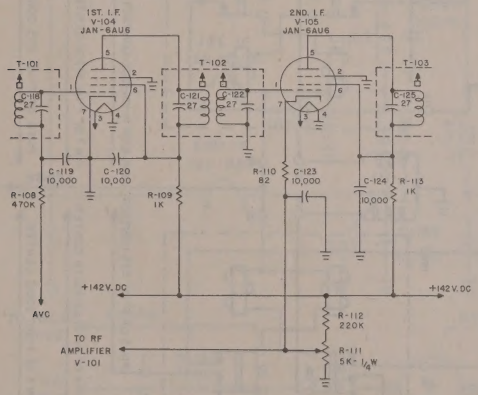


Figure 4-5. Radio Receiver R-150A/CRW-7 - I-F Amplifier Circuit

Special design has been employed in the automatic volume control circuit to insure effective action. This was necessary to prevent a strong signal from producing sufficient audio output voltage to block the audio filter and thereby cause spillover into adjacent channels. The automatic volume control voltage applied to the preceding stages is developed by a combination of the audio output voltage and the intermediate frequency signal voltage applied to the detector. These voltages are applied to plate pin number five through C-160 and C-128. The voltage developed across R-115 serves as delay voltage in the automatic volume control circuit. L-104 prevents any radio-frequency coupled to the triode plate from reaching the audio output. R-117 is the automatic volume control load resistor. R-118 and C-148B make up the automatic volume control filter and are of such values as to produce a long time constant.

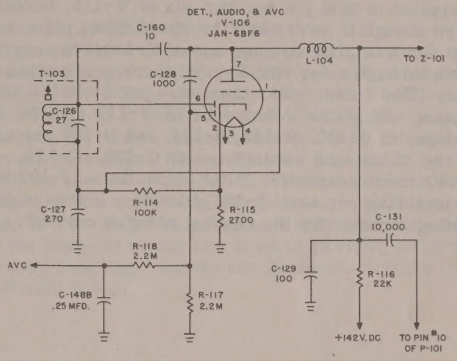


Figure 4-6. Radio Receiver R-150A/CRW-7 - Detector, AVC and Audio Amplifier Circuit

4-11. AUDIO FILTER. The audio filter (figure 7) has four selective networks, each responding to a different frequency. The primary of the filter (terminal number one) is coupled to the plate of the audio amplifier and forms part of the plate load of this tube (V-106). The secondary circuit terminated at terminal number six is tuned to 1900 cycles per second. The secondary circuit terminated at terminal five is tuned to 755 cycles per second. The secondary circuit terminated at terminal number four is tuned to 3000 cycles per second. The secondary circuit terminated at terminal number three is tuned to 475 cycles per second.

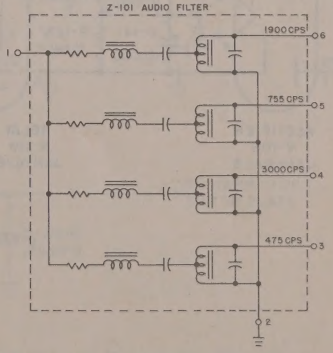


Figure 4-7. Radio Receiver R-150A/CRW-7 - Audio Filter

4-12. RECTIFIER AND RELAY TUBE CIRCUITS. (See figure 4-8). Connected to the four output terminals of the audio filter are two duo-diode rectifier tubes, V-107 and V-108 (JAN-6AL5). Each section of these tubes is used to rectify one of the four audio frequencies from filter Z-101. As an example the 475 cycles per second channel is rectified by one-half of V-108. The rectified voltage is developed across R-125 and is filtered by capacitor C-141. Tubes V-109 and V-110 are fixed biased beyond cutoff by means of a -12.6 volts applied to their common cathode circuit. When the voltage developed across R-125, which is applied to grid pin number six of V-110, becomes large enough to overcome the cutoff bias, plate current flows to plate number one of V-110. This current flows through relay coil K-102B thereby actuating the relay. The other audio channels operate in the same manner using the other half of V-110 and the two sections of V-109. R-122, R-123, and R-124 are used as the diode load resistors and C-138, C-139, and C-140 their respective filter capacitors. J-102 with its metering resistor R-126 provide a means of connecting a meter for the reading of relay current.

4-13. RELAY CIRCUIT. (See figure 4-8). Relay unit K-101 is the Pitch control and mounts two relays in a hermetically sealed can. Relay unit K-102 is the AZIMUTH control and mounts two relays in a hermetically sealed can. Each relay unit is identical. To clarify operation of the relay control tubes and relay contacts, in the discussion below, signals are traced through the circuits of tubes V-108 and V-110 and Relay K-102, which controls the azimuth circuit. This is done for no signal, for a signal of 475 cycles and a signal of 3000 cycles.

4-14. NO AUDIO SIGNAL. This condition exists when no radio frequency signal is received and when a radio frequency signal is received but not modulated with 475 or 3000 cycles per second audio frequencies (other audio frequencies will be prevented from reaching the grids of tube V-110 by filter Z-101). In either instance, the current of both plates of tube V-110 is less than 0.2 milliamperes. Relays K-102-A and K-102-B are not energized and are in the neutral position. The two bottom contacts of relays K-102-A and K-102-B are connected in series. One side of this circuit is grounded through terminal number two and L-112 and the other side is tied to terminal num-

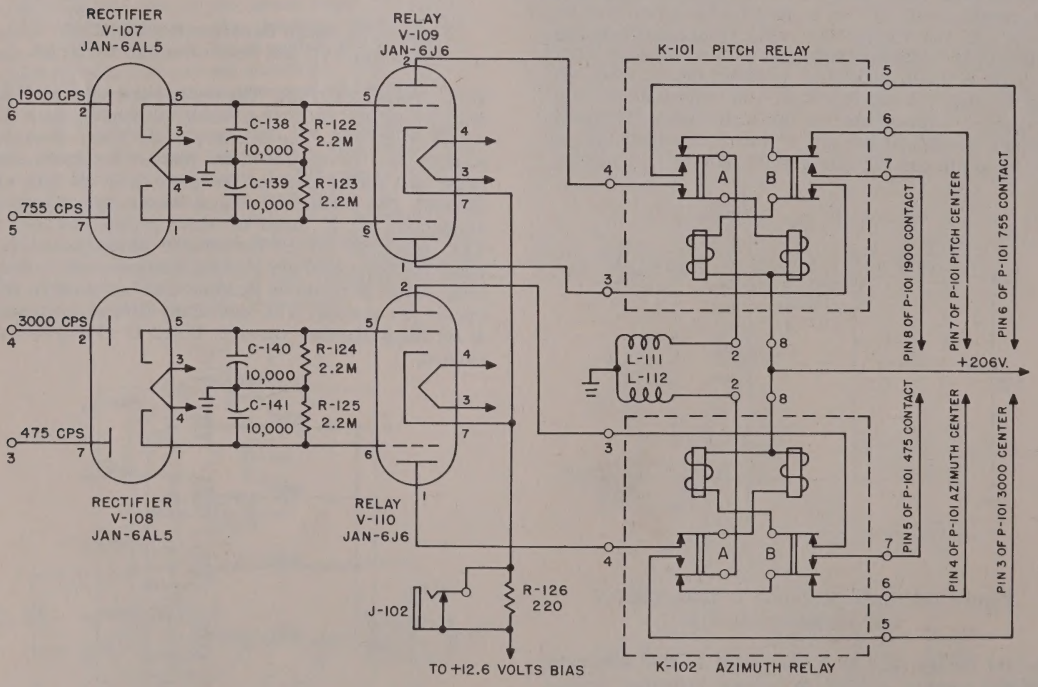


Figure 4-8. Radio Receiver R-150A/CRW-7. Rectifier and Relay Tube Circuits

ber six, thence to terminal number four of P-101. The open contact of K-102-A is connected to terminal number five and thence to pin number three of P-101. The open contact of K-102-B is connected to terminal number seven and thence to pin number five of P-101.

4-15. 475 CYCLES PER SECOND SIGNAL. The signal applied to terminal number seven of V-108, is rectified and sent to the grid (pin number six) of V-110. This signal causes plate current to flow to plate number one of V-110. The plate is connected to terminal number four of K-102. Thus the plate current flows through the coil of K-102-B causing the arm of relay K-102-B to be moved toward the coil. This opens up the contact connected to terminal number three and makes it impossible for current to flow in the number two plate circuit of V-110. It also disconnects terminal number six from ground and grounds terminal number seven and thus causes pin number five of P-101 to be placed at ground potential.

4-16. 3000 CYCLES PER SECOND SIGNAL. The signal applied to plate number two of V-108, is rectified and applied to pin number five of V-110. The number two plate of V-110 is connected to terminal number three of K-102, thus the plate current flows through the coil of Relay K-102-A causing it to activate the relay. This disconnects the plate lead from the number one plate of V-110 from the coil of K-102-B thus preventing simultaneous action by both relays. The same action disconnects terminal number four and pin number four of P-101 from ground and grounds terminal number five and pin number three of P-101.

4-17. TUBE V-110 AND RELAY K-101. The circuit operates in the same manner as described for V-109 and relay K-102, except that the circuit is actuated by 755 and 1900 cycles per second signals.

4-18. FILAMENT CIRCUIT. The filament circuit (Figure 4-9) is a series-parallel balanced string to conserve power and to permit operation of 6.3 volt tubes from a 21 volt supply. Resistor R-128 drops the voltage to a nominal value of 18.9 volts which is correct for three tubes in series. The voltage drop across part of the filament string is used to provide bias for the Relay tubes, 12.6 volts. Resistor R-129 balances the current in the center parallel group to that of the other two groups. Capacitors and chokes in the filament string are used to prevent radio-frequency coupling between the filament circuits of the different tubes.

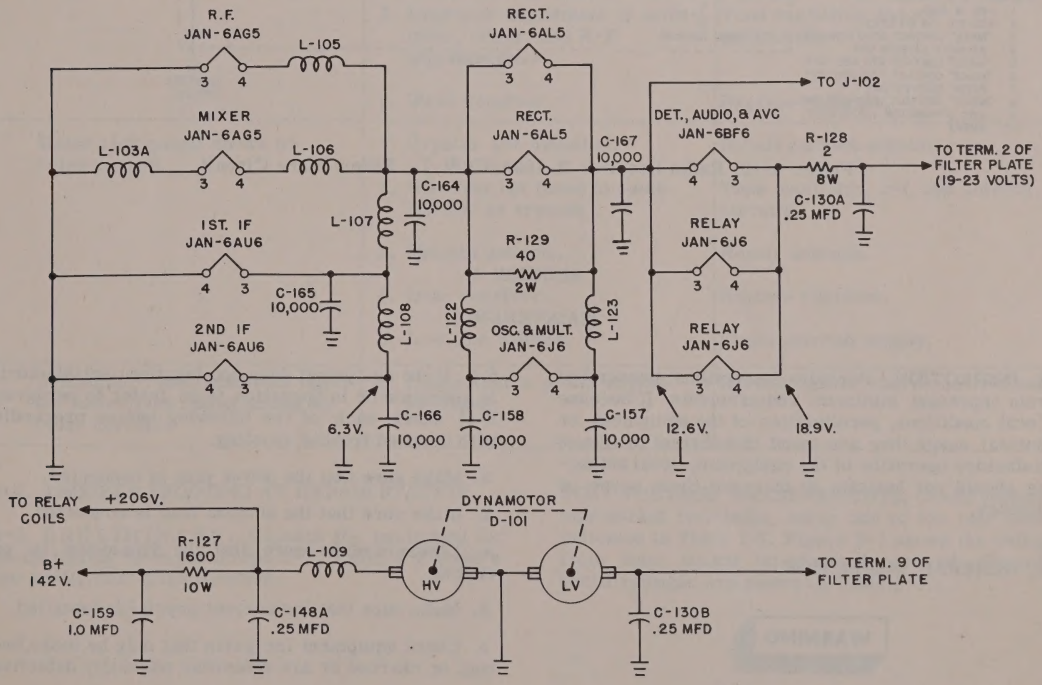


Figure 4-9 - Radio Receiver R-150A/CRW-7 - Filament and Dynamotor Circuit

4-19. DYNAMOTOR. The dynamotor circuit is shown in Figure 4-9. The dynamotor input rating is 28 volts direct current at 1.1 amperes. As used in this equipment the dynamotor is operated at a nominal input of 21 volts so the output is correspondingly reduced. It is so constructed as to withstand continuous operation over a long period of time without danger of overheating and will require little attention. Filtering the output is accomplished by an inductor L-109, capacitor C-148-A, resistor R-127 and capacitor C-159.

4-20. FILTER PLATE. (See figure 4-10). It is essential in a receiver of this type that there be a minimum of radio frequency leakage and conducted noise. Careful binding will prevent some leakage but this is ineffective as far as the cables are concerned. To prevent any stray leakage or conducted noise from the leads, all of them with the exception of the filament lead and the power lead are connected to a Pi section filter. The two receptions mentioned use L section filters.

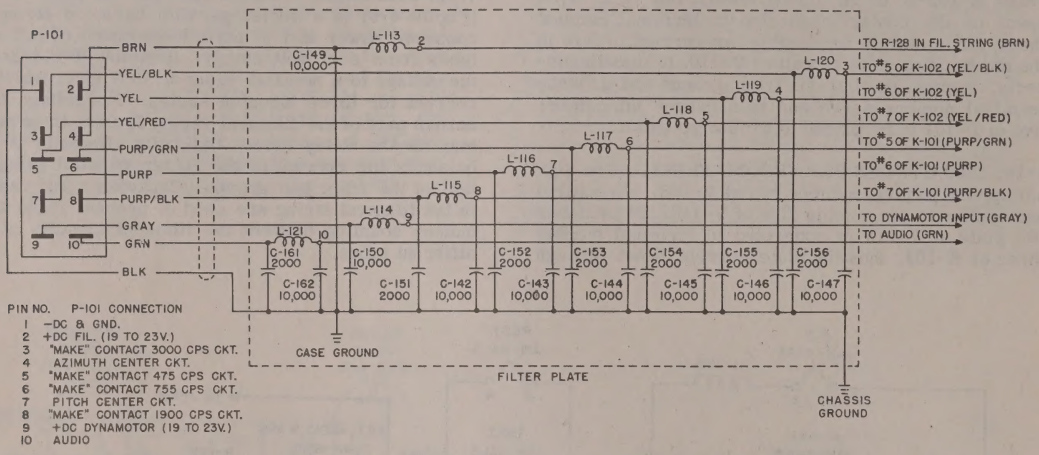


Figure 4-10. Radio Receiver R-150A/CRW-7 - Filter Plate Circuit

SECTION V

MAINTENANCE

5-1. INSPECTION. Periodic inspections prescribed herein represent minimum requirements. If because of local conditions, peculiarities of the equipment, or abnormal usage they are found insufficient to assure satisfactory operation of the equipment, local authorities should not hesitate to increase their scope or efficiency.

5-2. GENERAL INSPECTION.

WARNING

This equipment employs high voltages which are dangerous and may be fatal if contacted by personnel. Extreme caution should be exercised when working with the equipment.

5-3. If the equipment does not function satisfactorily in operation or in operation tests (refer to paragraph 2-4) check each of the following before proceeding with detailed trouble shooting.

a. Make sure that the power plug is connected.

b. Make sure that the antenna lead is connected.

c. Listen to make sure that the dynamotor is operating.

d. Make sure that the correct crystal is installed.

e. Check equipment for parts that may be loose, broken, or charred or are otherwise obviously defective.

f. Check the direct-current voltage at number two and number nine prongs of the power plug. The voltage between these prongs and ground should be $\neq$ 19 to $\neq$ 23 volts direct-current.

Note

If inspection shows trouble in any part of the equipment as listed above, repair or replace that part.

5-4. TROUBLE SHOOTING INSTALLED EQUIPMENT

5-5. GENERAL. The after installation test given in paragraph 2-13 will indicate whether or not the equipment is operating satisfactorily. The major causes of trouble will include incorrect installation, no crystal installed, incorrect crystal, antenna or radio frequency circuits not tuned, incorrect line voltage, and defective receiver.

5-6. TROUBLE CHART. Table 5-1 lists a few easily located troubles and their remedies.

5-9. DETAILED TROUBLE SHOOTING PROCEDURES

5-10. GENERAL. To localize trouble, first trace it to some particular section in the equipment. After the trouble has been traced to a particular section, break that section into its various stages to determine in which stage the trouble exists. Each stage will break down into various circuits such as grid, plate, cathode and screen grid. Frequently, after trouble has been traced to a particular stage, checking the tube and voltages at the tube terminals will indicate the trouble. If usual preliminary tests do not localize the trouble, it usually can be localized by either of three general methods; voltage measurements, signal tracing, and resistance measurements. All three methods are effective, as well as the three combined. It is recommended that voltage measurements be tried first.

TABLE 5-1. TROUBLE CHART FOR INSTALLED EQUIPMENT

SYMPTOM	TROUBLE LOCATION	REMEDY
Meter jack output shows low relay current.	1. Improper adjustment of antenna trimmer.	Tune antenna trimmer.
	2. Low line voltage.	Check aircraft supply.
	3. Improper adjustment of multiplier, mixer, and R-F adjustments.	Tune oscillator and r-f adjustments.
	4. Weak receiver.	Replace reciever.
Meter jack output shows no relay current.	1. Crystal not installed.	Install correct crystal.
	2. Receiver not tuned to same channel as crystal.	Tune oscillator, r-f, and antenna circuits.
	3. Shorted antenna.	Repair antenna.
	4. Dead receiver.	Replace receiver.
	5. Low line voltage.	Check aircraft supply,
Dynamotor runs, filaments light, but meter jack output shows no relay current.	1. Connection to power source reversed	Reverse power source connections.

5-7. TROUBLE SHOOTING AT REPAIR STATION.

5-8. PRELIMINARY. Connect the equipment for bench testing as in paragraph 2-7. Table 5-2 gives a few easily corrected troubles.

5-11. VOLTAGE MEASUREMENTS. Check voltage at tube socket terminals, using one of the test meters indicated in Table 1-2. Figure 5-1 shows the voltages from tube socket terminals to ground. Terminal board voltages are shown in Table 5-3.

TABLE 5-2 - TROUBLE CHART FOR BENCH REPAIR

SYMPTOM	INDICATED SOURCES OF TROUBLE
Meter jack output shows low relay current.	1. Improper adjustment of antenna trimmer. 2. Low line voltage. 3. Improper adjustment of multiplier, mixer and r-f adjustment. 4. Improper adjustment of sensitivity control. 5. Weak tube.
Meter jack output shows no relay current.	1. Crystal not installed. 2. Receiver not tuned to same channel as crystal. 3. Weak or dead tube. 4. No filament voltage. 5. No. B ƒ voltage from drynamotor. 6. Failure of resistors or capacitors.
Meter jack output shows relay current too high with no signal.	1. Relay tubes V-109, or V-110 do not have proper cut-off characteristic.
Meter jack output shows proper relay current but relay contacts do not function properly.	1. Faulty relay K-101 or K-102 in receiver.
Excessive line current	1. Filament circuit short. 2. B ƒ circuit short. 3. Shorted vacuum tube. 4. Dynamotor stuck.
Oscillation in receiver	1. Open by-pass capacitor. 2. Poor ground connection.
Intermittent operation of receiver	1. Tube pins not making good contact in socket. 2. Faulty tube.

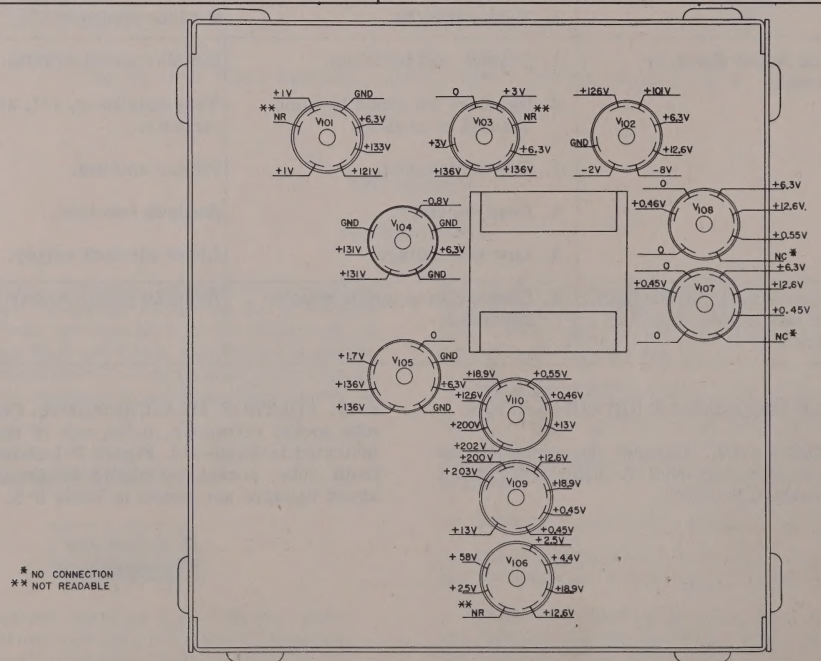


Figure 5-1. Tube Socket Voltages from Terminal to Ground with Receiver Voltage of 21 Volts for a Test Meter Having a Sensitivity of 20,000 Ohms per Volt.

TABLE 5-3. - VOLTAGES FROM TERMINAL BOARD LUGS TO GROUND FOR A TEST METER HAVING A SENSITIVITY OF 20,000 OHMS PER VOLT

Terminal Board No.	Terminal Number (Values in Volts) 1	2	3	4	5
E-101	⁄133	⁄142	⁄6.3	0	⁄137
E-102	⁄0.2	⁄206	⁄142		
E-103	⁄131	NR*	⁄142		
E-104	NR	⁄58	–0	⁄142	⁄58
E-105	⁄101	⁄142	⁄126		
E-107	⁄142				

	2	3	4	5	6	7	8	9	10	11	12
E-106	⁄21	⁄21	0	⁄21	⁄21	0	⁄21	⁄21	0	⁄21	⁄21

	13	14	15	16	17	18	19
E-106	0	⁄21	⁄21	0	⁄21	⁄21	0

* Not readable

TABLE 5-4. - VOLTAGES FROM TERMINAL BOARD LUGS TO GROUND FOR A TEST METER HAVING A SENSITIVITY OF 1,000 OHMS PER VOLT.

Terminal Board No.	Terminal Number (Values in volts) 1	2	3	4	5
E-101	⁄130	⁄138	⁄6.3	0	⁄131
E-102	⁄0.2	⁄197	⁄138		
E-103	⁄128	NR	⁄138		
E-104	NR	⁄56	0	⁄138	⁄56
E-105	⁄98	⁄138	⁄122		
E-107	⁄138				

	2	3	4	5	6	7	8	9	10	11	12
E-106	⁄21	⁄21	0	⁄21	⁄21	0	⁄21	⁄21	0	⁄21	⁄21

	13	14	15	16	17	18	19
E-106	0	⁄21	⁄21	0	⁄21	⁄21	0

Note: Readings taken under the following conditions:

1. Sensitivity control adjusted for maximum gain (full clockwise position).
2. Antenna disconnected.
3. Receiver properly aligned to channel D-1.
4. Bottom cover and bottom shield plate removed.
5. Input voltage, 21 volts at receiver.

5-12. RESISTANCE MEASUREMENTS. Make sure that connector P-101 is disconnected before making resistance measurements in the receiver. Check the resistance to ground of the tube socket terminals. Refer to Figure 5-2. Table 5-5 gives the terminal board resistances. Resistance values may show a normal variation up to 25 percent.

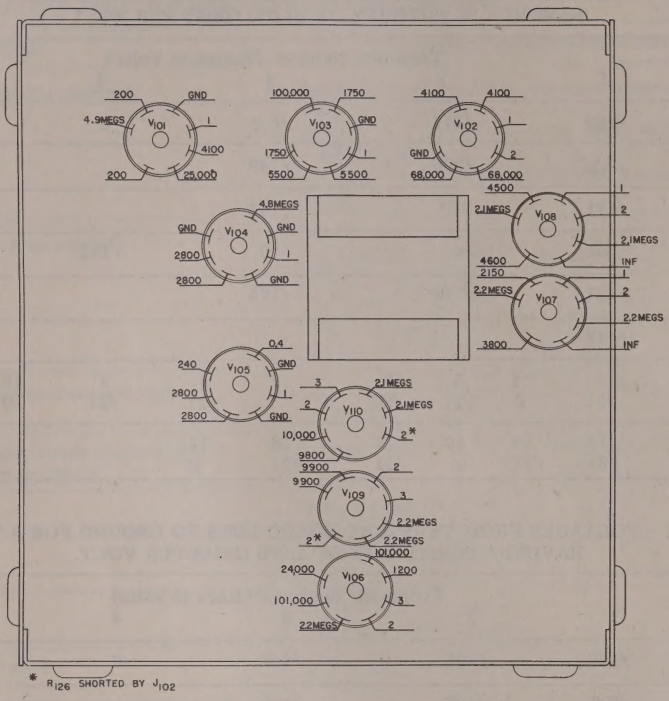


Figure 5-2. Resistance from Tube Terminals to Ground with P-101 Disconnected

TABLE 5-5. - RESISTANCES FROM TERMINAL BOARD LUGS TO GROUND WITH CONNECTOR P-101 DISCONNECTED FROM POWER SUPPLY.

Terminal Board No.	Terminal Number (Values in Ohms Unless Marked Megohms)								
	1	2	3	4	5				
E-101	4100	1800	1	0	5500				
E-102	26	192	1800						
E-103	2800	4.4 megs	1800						
E-104	4.4 megs	24,000	inf*	1800	24,000				
E-105	4100	1800	4100						
E-107	1800								
	2	3	4	5	6	7	8	9	10
E-106	4.9	inf	0.2	inf	inf	0.2	inf	2.4	inf
	11	12	13	14	15	16	17	18	19
E-106	4.9	inf	0.2	inf	inf	0.2	inf	2.4	inf

* Open DC Circuit to ground.

Note

Resistances at all points in the B+ circuit are subject to considerable variation because of the dynamotor. Resistance of the dynamotor high-voltage terminals varies from approximately 200 to 1500 ohms, depending on the position of the commutator when it stops.

5-13. SIGNAL TRACING. Localizing faults by signal tracing also involves voltage and resistance checks to localize the trouble within a stage.

5-14. AUDIO TEST.

a. Connect a headset to pins one and ten of P-101. Apply an audio signal of 1900 cycles per second to pin number six of V-106. If a signal is not heard, check V-106 and the associated resistors and capacitors. Also check C-131.

b. Connect a test meter (TS-352/U or TS-297/U) to J-102. Apply an audio signal of 1900 cycles per second to pin number two of V-107. If a current reading is not indicated on the meter, check the following: V-107, V-109, C-138, R-122. Apply an audio signal of 755 cycles per second to pin number seven of V-107, If a current reading is not indicated on the meter, check the following: V-107, V-109, C-139, R-123. Apply an audio signal of 3000 cycles per second to pin number two of V-108. If a current reading is not indicated on the meter, check the following: V-108, V-110, C-140, R-124. Apply an audio signal of 475 cycles per second to pin number seven of V-108. If a current reading is not indicated on the meter, check the following: V-108, V-110, C-141, R-125.

c. To check the audio filter, connect a test meter to J-102 and apply an audio signal of 1900, 755, 3000 and 475 cycles per second in succession to terminal number one of the audio filter. If a current indication on the test meter is not obtained for any one frequency and performance of V-107, V-108, V-109 and V-110 is known to be satisfactory, it will be necessary to replace the filter.

d. Connect TS-604/U to P-101. Apply the four test audio signals in succession. (It is assumed that the audio section up to the relays has been checked). If the test set indicates the failure of a relay, it will be necessary to replace either K-101 or K-102.

5-15. INTERMEDIATE FREQUENCY TEST. (The audio section is presumed to be working satisfactorily). Signal Generator TS-452/U is used. If not familiar with this instrument, refer to the Operator's Handbook for signal Generator TS-452/U. Instructions for connecting TS-452 to the receiver and the output indication desired are given in paragraph 5-29. If the intermediate frequency signal does not pass through the set, apply the signal to the control grid (pin number one) of V-104 and next to the control grid (pin number one) of the second intermediate-frequency stage V-105 until the trouble has been localized to one particular stage. When trouble is found in any one stage, check the components of that stage for possible faulty operation.

5-16. RADIO FREQUENCY TEST. If not familiar with the use of Test Oscillator TS-326A/U, refer to the Operator's Handbook for Test Oscillator TS-326A/U. Apply the correct radio frequency channel to the control grid (pin number one) of V-103. This will be nine times the frequency of the crystal plus 15 megacycles. Modulate the signal 60% with one of the audio channel frequencies. If proper relay operation results, the high frequency oscillating section is operating properly. If no relay action results, check component parts of the oscillator section. The last remaining stage to be checked is the radio frequency amplifier tube V-101. Apply the radio frequency channel signal modulated with one of the four audio frequencies to the antenna lead. If the relay action was obtained with the signal applied to the mixer but not with the signal applied to the antenna, then the trouble must be in the radio-frequency stage. Check component parts for defects.

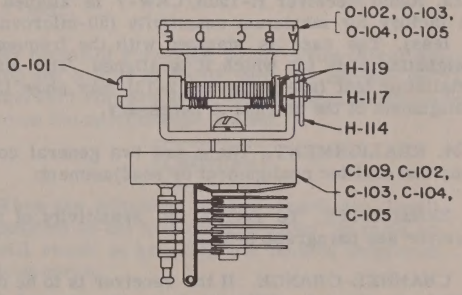


Figure 5-3. Radio Receiver R-150A/CRW-7 Tuning Capacitor Assembly Details

5-17. SPECIAL MAINTENANCE OPERATIONS.

5-18. REMOVAL OF CHASSIS FROM CASE.

a. Remove bottom cover (See figure 1-3) by removin the 15 screws on the side of the case.

b. Remove the five screws which hold the filter plate to the side of the case.

c. Remove the shielding plate by removing the nine screws holding it in place.

d. Withdraw the chassis from the case, taking care not to damage the cable.

5-19. REPLACING CHASSIS IN CASE. Refer to paragraph 4-A of this section and perform the steps listed in reverse order.

5-20. ASSEMBLY OF TUNING CAPACITORS. Location of parts and their reference numbers are illustrated in figure 5-3. Each of the five tuning capacitors has its own dial. All of them are lettered from "A"

to "E" with the exception of the Radio Frequency Grid adjustment (See figure 1-2) which is numbered from "0" to "10". Five different capacitors are used; with two of them, C-102,and C-103, being identical.

5-21. DYNAMOTOR LUBRICATION. These dynamotors are lubricated at the factory for approximately 1000 hours operation. To lubricate, unscrew the bearing grease retainers and apply enough grease to cover the bearings, using Army/Navy Aeronautical Specifications AN-G-25 (2).

CAUTION

Do not pack the bearings or allow dirt to enter the bearing housings. Keep grease off the commutators.

5-22. ALIGNMENT AND ADJUSTMENT.

5-23. Radio Receiver R-150A/CRW-7 is aligned at the factory for maximum sensitivity (50-microvolts or less). The case is stamped with the frequency designating code for which it is aligned. The after installation test (see paragraph 2-13) may show that realignment of the antenna is necessary.

5-24. REALIGNMENT. There are two general contions that call for realignment or readjustment:

a. SENSITIVITY. To reduce the sensitivity of the receiver see paragraph 5-32.

b. CHANNEL CHANGE. If the receiver is to be operated on channels different from the channel for which it was aligned at the factory, realign the radio frequency and multiplier circuits.

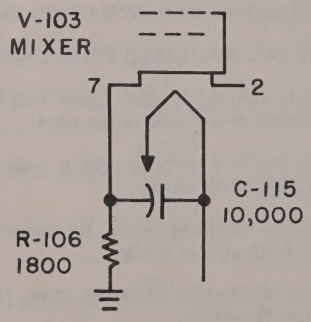


Figure 5-4. Mixer Cathode Circuit

Note

In Radio Receivers R-150A/CRW-7 bearing serial numbers 2 to 5, 7 to 54, 56 to 100, 102 to 108, 110 to 130, 140 to 146, 148 to 149, 201 to 210, 212 to 214, and 216 to 233, (all numbers inclusive) R-106 and C-115 in the cathode circuit of the mixer stage were connected as shown in figure 5-4. During production a minor revision was made to improve performance on channels C-9 and C-10 by connecting R-106 and C-115 as shown on the schematic diagram (see figure 8-12). It is necessary to make this revision on any receiver bearing one of the above serial numbers before attempting to align it for operation on Channel C-9 or C-10.

5-25. EQUIPMENT REQUIRED FOR ALIGNMENT.

a. Test Oscillator TS-326A/U.

b. Test Meter TS-352/U or TS-297/U.

d. Power Source - Battery or filtered generator adjustable to 21 volts direct current.

d. Alignment Tool (non-magnetic screw driver).

e. Relay test set TS-604-U.

5-26. ALIGNMENT PROCEDURE FOR RECEIVER.

Note

In making adjustments of various capacitors in the following alighment procedures, there is a possibility of tuning to a harmonic of the desired frequency. To avoid this, rock the capacitors setting and select the resonant position which indicates the greatest relay current.

5-27. INTERMEDIATE FREQUENCY ALIGNMENT

Note

The intermediate frequency circuits of this receiver have been accurately tuned at the factory against crystal oscillators. They should not be touched unless the intermediate-frequency transformers are replaced, or unless it is definitely established that the receiver is off frequency. For intermediate frequency alignment it is necessary to remove the receiver chassis from the case. (See paragraph 5-18, this section, for instruction). Two methods of aligning the intermediate frequency circuits are given in paragraphs 5-28 and 5-29.

5-28. INTERMEDIATE FREQUENCY TOUCH-UP PROCEDURE USING RADIO FREQUENCY SIGNAL. This procedure is for circuits only slightly off tune. It can be used only when the radio frequency section of the receiver is operative and properly adjusted as a radio frequency signal is used.

a. Connect the output of Test Oscillator TS-326A/U to the antenna lead of the receiver.

b. Connect Test Meter TS-352/U or TS-297/U to the relay current meter jack by means of Plug PL-55 and switch the meter to the 10-milliampere scale.

c. Connect the system to a 21 volt direct current source using connector J-101.

d. Set the test oscillator for the radio frequency signal corresponding to the channel to which the receiver is tuned. Make sure the correct crystal is installed in the receiver and in the test oscillator.

e. Make sure the shielding plate is in place over the oscillator and radio frequency coils, and that the antenna, radio frequency, and multiplier adjustments are peaked. (See figure 1-2).

f. Set the test oscillator for 54 percent modulation for 475 cycles per second.

g. Set the receiver sensitivity control to maximum.

h. Adjust the test oscillator output for 4.5 milliamperes relay current as indicated by the relay current test meter.

i. Loosen the locking nuts on the intermediate frequency transformer core adjusting screws at the top and bottom of transformers T-103, T-102, and T-101 (See figure 8-1). The nuts at the bottom are reached from the underside of the chassis.

j. By means of a suitable small screw driver turn the slotted adjusting screws at the top and at the bottom of T-103 until maximum output is obtained on the relay current test meter.

CAUTION

When the adjusting screws reach the "out" position do not force them further, as to do so will result in breaking the molded powdered iron cores.

k. Tune T-102 in like manner by adjusting the two core screws for maximum relay current output.

l. Tune T-101 in like manner by adjusting the two core screws until maximum output is obtained.

m. Reduce the output of the test oscillator if necessary during the alignment procedure in order to keep the relay current at about 4.5 milliamperes.

n. Tighten the locking nuts on the intermediate-frequency transformer core adjusting screws using extreme care not to disturb the position of the adjusting screws.

5-29. COMPLETE INTERMEDIATE FREQUENCY ALIGNMENT PROCEDURE USING INTERMEDIATE FREQUENCY SIGNAL. For this alignment procedure Signal Generator TS-452/U should be used. All other test equipment should be disconnected from the receiver during alignment. TS-452/U consists of a sweep generator and an oscilloscope combined in one portable unit. Provision is made within the unit to supply the necessary marker frequency by means of a wavemeter section. If not familiar with the operation of this equipment carefully study the Handbook for TS-452/U before proceeding as follows:

a. Set up TS-452/U to sweep the 15 megacycle band and to supply a marker frequency at exactly 15 megacycles in accordance with instructions given in the Handbook for TS-452/U.

b. Connect the radio frequency output of TS-452/U to the grid of the mixer tube V-103. This connection is most easily made by connecting the hot terminal of the signal output cable to the stator terminal of C-103 by means of a clip lead and the ground terminal of the signal output cable to the shield partition adjacent to C-103 keeping the leads as short as possible.

c. Connect the "traveling detector probe" which is supplied with TS-452/U to pin number six of V-106.

d. Set the receiver sensitivity control to maximum and adjust the controls on TS-452/U as necessary to give a useful pattern on the oscilloscope screen on the front panel of TS-452/U.

e. Loosen the locking nuts on the adjusting screws at the top and bottom of Transformers T-101, T-102 and T-103.

f. By means of a suitable small screw driver adjust the top and bottom of T-103 until the marker dot (15 mc marker) appears at the highest peak shown on the curve on the oscilloscope screen.

CAUTION

When the adjusting screws reach the "out" position do not force them further, as to do so will result in breaking the molded powdered iron cores.

Note

If the Intermediate Frequency transformers are badly out of alignment it may not be possible to obtain this condition until T-101 and T-102 are roughly set. If necessary make a rough setting of the adjustments on T-101 and T-102 and repeat step f.

g. Adjust the top and bottom slugs of T-102 and T-101 respectively until the marker appears at the highest peak shown on the curve on the oscilloscope screen.

h. Repeat steps f and g until it is evident the transformers are sharply peaked at 15 megacycles.

i. Tighten the locking nuts on the intermediate frequency transformer core adjusting screws using extreme care not to disturb the position of the adjusting screws.

5-30. RADIO FREQUENCY AND OSCILLATOR ALIGNMENT.

a. Connect the receiver to a power source through relay test set TS-604/U and adjust the supply voltage to 21 volts direct current. Refer to the Handbook for relay test set TS-604/U.

b. Connect the output cable of Test Oscillator TS-326A/U to the receiver, connecting the hot terminal of the cable to the antenna wire of the receiver and the ground lead of the cable to the chassis of the receiver.

c. Connect Test Meter TS-352/U or TS-297/U to the relay current meter jack by means of Plug PL-55 and switch the meter to the 10 milliampere scale.

d. Install a receiver crystal corresponding to the channel frequency desired in the receiver. (See paragraph 6-3).

e. Mechanically set the receiver tuning dials to their approximate position by turning the slotted tuning shafts adjacent to the tuning dials. The nominal calibration of the dials follows:

CHANNEL	DIAL MARKING
A-5	A
B-5	B
C-5	C
D-5	D
E-4	E

Other channels would be at intermediate points. A-1 will be a slightly lower point on the dial than the A mark. A-10 will be about half way between the A and B marks, B-1 will also be about half way between A and B marks. The dial calibration of the receiver is not held to close limits, as it is only intended that it give a mechanical setting which is near enough to the final tuning point so the receiver will not be tuned to the wrong harmonic of the crystal.

f. Turn the test oscillator on and allow it to warm up.

g. Refer to the instruction book for Test Oscillator TS-326A/U for operating instructions for this equipment.

h. Tune the five slotted tuning shafts of the receiver shown in figure 1-2 for maximum output as indicated by the relay current test meter.

These tuning shafts tune the following:

1. First Multiplier
2. Second Multiplier
3. Mixer Grid adjustment
4. Radio frequency plate adjustment
5. Radio frequency grid adjustment

As the receiver tuning progresses, reduce the test oscillator output by means of the attenuator and multiplier dials of the test oscillator to keep the relay output current about 4.5 milliamperes.

i. Rock in the antenna trimmer (antenna series condenser C-101) and the radio frequency grid adjustment (C-106). Rocking in is done by successively tuning the two adjustments several times.

5-31. SETTING THE LEVEL

5-32. The sensitivity of radio receiver R-150/CRW-7 may be set to a desired level by the proper positioning of the sensitivity control. To insure proper operation on all audio channels the weakest audio channel, of the receiver under adjustment, is used in setting the level. To determine the weakest audio channel proceed as follows:

a. Set the receiver sensitivity control to maximum.

b. Adjust the receiver line voltage to 19 volts.

c. Set the test oscillator for an out of 50 microvolts modulated 54 percent.

d. Apply successively the four modulating frequencies 475, 755, 1900, and 3000 cycles, observing the relay current produced by each of the modulating frequencies. The frequency producing the lowest relay current should be used throughout the remainder of this procedure.

5-33. Adjust the test oscillator for an output of 20 microvolts less than the desired receiver sensitivity. (For example if a sensitivity of 100 microvolts is desired use an output of 80 microvolts. If the desired sensitivity is 68 microvolts use an output of 48 microvolts). The level may now be set as follows:

a. Adjust the sensitivity control until the relay current is five milliamperes.

b. Retune the antenna trimmer control and the radio frequency grid adjustment in accordance with instructions given in paragraph 2-10.

c. Repeat steps a and b until the relay current is maintained at five milliamperes.

d. Increase the output of the test oscillator by 20 microvolts and check the operation of the receiver on all channels according to the chart given in table 2-1.

CAUTION

It is important that the receiver line voltage be maintained at 19 volts while setting the level. The antenna trimmer control and radio frequency grid adjustment must be retuned each time the position of the sensitivity control is changed.

5-34. TO REDUCE SENSITIVITY. Radio Receiver R-150A/CRW-7 has been set at the factory for maximum sensitivity (50 microvolts or less). To reduce sensitivity follow the procedure given in paragraph 5-33.

SECTION VI

SUPPLEMENTARY DATA

6-1. TUBE COMPLEMENT FOR RADIO AN/ARW-10A. Refer to Table 6-1.

TABLE 6-1 - TUBES IN RADIO RECEIVER R-150A/CRW-7

Quantity	Reference Symbol	Type Designation	Function
1	V-101	JAN-6AG5	R-F amplifier
1	V-102	JAN-6J6	Oscillator and Frequency Multiplier
1	V-103	JAN-6AG5	Mixer
1	V-104	JAN-6AU6	1st I-F amplifier
1	V-105	JAN-6AU6	2nd I-F amplifier
1	V-106	JAN-6BF6	Detector, Audio amplifier & AVC
1	V-107	JAN-6AL5	Rectifier
1	V-108	JAN-6AL5	Rectifier
1	V-109	JAN-6J6	Relay current amplifier
1	V-110	JAN-6J6	Relay current amplifier

6-2. FREQUENCY RANGE. The receiver frequency range is 65.94 to 92.85 megacyles.

6-3. CRYSTAL AND CHANNEL FREQUENCIES. Refer to Table 6-2.

6-4. AUDIO RESPONSE CHARACTERISTICS. The audio filter contains four filter units which respectively pass frequencies of 475, 755, 1900 and 3000 cycles per second. The 755 and 1900 cycles per second frequencies are not used in this equipment. The selectivity of the filter is plotted in the graph shown in figure 6-1.

6-5. SENSITIVITY. The sensitivity is set at the factory for maximum sensitivity (50 microvolts or less).

6-6. AUTOMATIC VOLUME CONTROL. The following table shows typical automatic volume control data on a typical receiver for line voltage of 21 volts. Radio-Frequency channel C1, modulation 475 cycles at 54 percent. VB-3 dummy antenna was used.

Input Microvolts	Output Relay Current (ma)
5	7.6
10	8.6
50	8.9
500	9.0
5000	9.1
50,000	9.1

6-7. RELAY SENSITIVITY. Relays pull in between 2.5 and 3.5 milliamperes current and drop out between one and two milliamperes.

6-8. SELECTIVITY. The total bandwidth for a typical receiver is shown in the following table: (Test conditions the same as in paragraph 6-6 above).

Signal Ratio	Total Bandwidth (Kilocycles)
2 x	161
10 x	297
100 x	486
1000 x	702

6-9. CURRENT REQUIREMENTS.

a. Nominal running currents for 21 volts at the receiver are as follows:

Filament	1.5 amp.
Dynamotor	.9 amp.
Total	2.4 amp.

b. The starting current for the 21 volt line is 6.5 amperes (surge).

TABLE 6-2 - CRYSTAL AND CHANNEL FREQUENCIES

Channel Code Symbol	Receiver Crystal Frequency (kc)	Channel Frequency (mc)
A-1	5660	65.94
A-2	5710	66.39
A-3	5780	67.02
A-4	5840	67.56
A-5	5890	68.01
A-6	5950	68.55
A-7	6040	69.36
A-8	6130	70.17
A-9	6200	70.80
A-10	6250	71.25
B-1	6310	71.79
B-2	6420	72.78
B-3	6487.5	73.3875
B-4	6550	73.95
B-5	6600	74.40
B-6	6650	74.85
B-7	6710	75.39
B-8	6770	75.93
B-9	6830	76.47
B-10	6890	77.01
C-1	6940	77.46
C-2	7010	78.09
C-3	7060	78.54
C-4	7130	79.17

Channel Code Symbol	Receiver Crystal Frequency (kc)	Channel Frequency (mc)
C-5	7180	79.62
C-6	7240	80.16
C-7	7290	80.61
C-8	7340	81.06
C-9	7400	81.60
C-10	7600	83.40
D-1	7660	83.94
D-2	7710	84.39
D-3	7780	85.02
D-4	7830	85.47
D-5	7890	86.01
D-6	7950	86.55
D-7	8000	87.00
D-8	8060	87.54
D-9	8120	88.08
D-10	8188	88.692
E-1	8250	89.25
E-2	8310	89.79
E-3	8362.5	90.263
E-4	8428	90.852
E-5	8492.31	91.431
E-6	8570	92.13
E-7	8650	92.85

SECTION VII

TABLE OF REPLACEABLE PARTS

7-1. INTRODUCTION. The parts listed in this table do not constitute a complete electrical and mechanical breakdown of the equipment. This table lists all electrical parts together with such operative mechanical parts as are subject to loss or failure, with the exception of structural and minor parts such as standard bolts, screws, nuts, and the like. In some instances individual detail parts of a sub-assembly may not be listed as separate items, since replacement of such items are impractical.

7-2. ORDERING OF SPARE PARTS. Each service using this list has established certain depots and service groups for the storage and issue of spare parts to its organizations requiring them. The regulations of each service should be studied to determine the methods and source for requisitioning spare parts. The information in this list, as to manufacturer's or contractor's name, type, model, or drawing number is not to be interpreted as authorization to field agencies to attempt to purchase identical or comparable spare parts directly from the manufacturer or a wholesale or retail store except under emergency conditions as covered by existing regulations of the Service concerned.

U.S. Army Personnel: This table is for information only and is not to be used as a basis for requisitioning parts. Authorities for obtaining maintenance items are as follows: 1. For using organizations: applicable Service publications of the 00-30 series of Army Air Force Technical Orders. 2. For higher maintenance and supply echelons: applicable Service publications of the 08-55 series of Army Air Force Technical Orders.

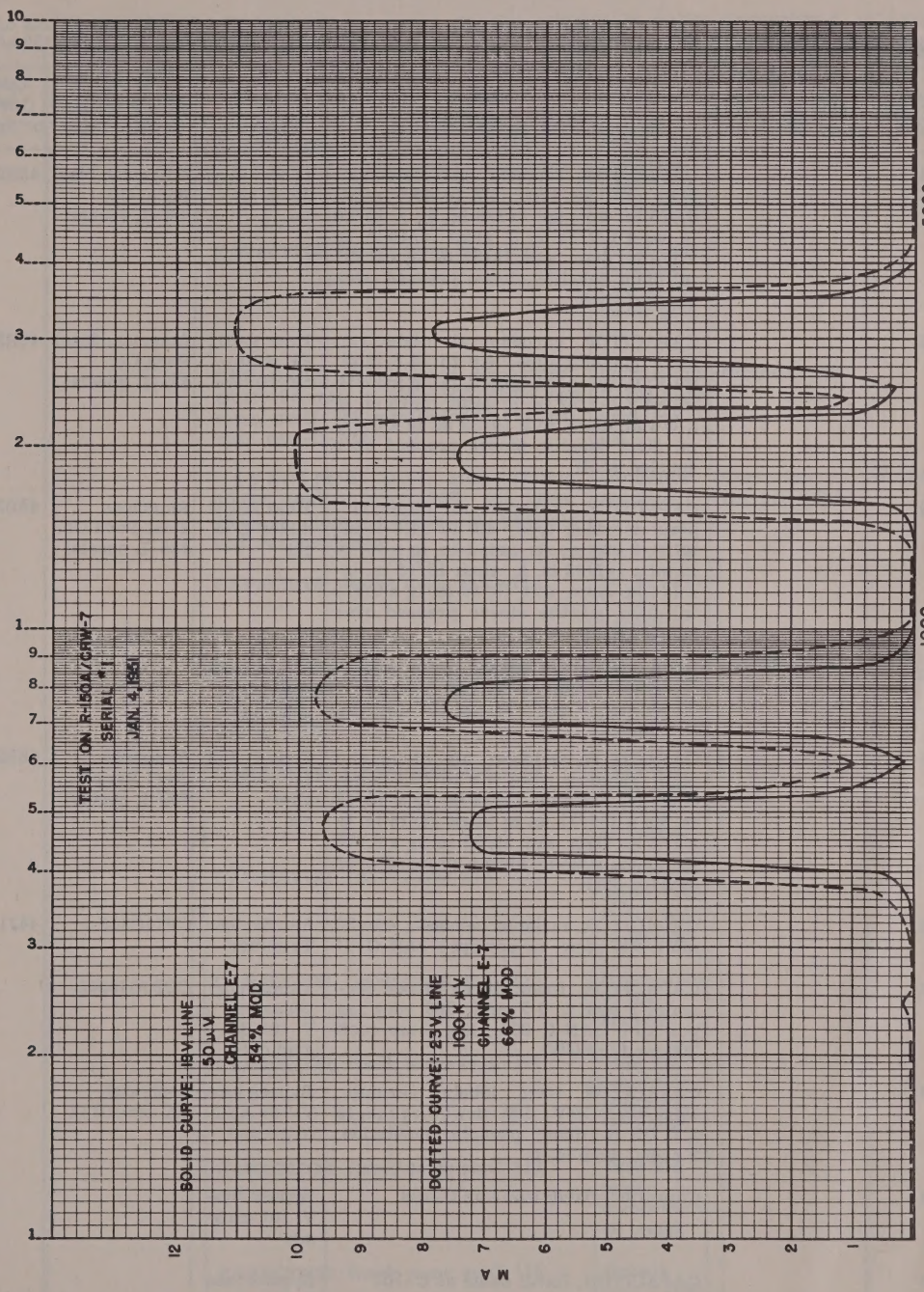


Figure 6-1. Radio Receiver R-150A/CRW-7 - Audio Response Characteristics

TABLE OF REPLACEABLE PARTS

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
C-101		CAPACITOR, variable: air dielectric; plate meshing type; 4.8 to 49.6 mmf; 0.020 in. air gap; 1-1/8 in. lg x 15/16 in. wd x 1-7/32 in. h; shaft 15/16 in. lg x 1/4 in. diam with 19/32 in. lg x 0.375 in. diam bakelite sleeve pressed over knurled shaft	Tune V-101 RF grid ckt	American Steel Pack. Co. #50-L special	48B219
C-102		CAPACITOR, variable: air dielectric; plate meshing type; 4.0 to 34.8 mmf; MLF; 0.020 in. air gap; 1 in. lg x 15/16 in. wd x 1-7/32 in. h; shaft 15/16 in. lg x 1/4 in. diam with 19/32 in. lg x 0.375 in. diam bakelite sleeve pressed over knurled shaft	Tune V-101 RF plate ckt	American Steel Pack Co. #35-L special	48B217
C-103		CAPACITOR, variable: air dielectric; plate meshing type; 4.0 to 34.8 mmf; MLF; 0.020 in. air gap; 1 in. lg x 15/16 in.wd x 1-7/32 in. h; shaft 15/16 in. lg x 1/4 in. diam with 15/16 in. lg x 0.375 in. diam bakelite sleeve pressed over knurled shaft	Tune V-103 mixer grid ckt	American Steel Pack Co. #35-L special	48B218
C-104		CAPACITOR, variable: Same as C-101	Tune V-102 2nd multi-plier ckt		
C-105		CAPACITOR, variable: air dielectric; plate meshing type; 4.8 to 49.6 mmf; 0.020 in. air gap; 1-1/8 in. lg x 15/16 in. wd x 1-7/32 in. h; shaft 15/16 in. lg x 1/4 in. diam with 19/32 in. lg x 0.375 in. diam bakelite sleeve pressed over knurled shaft	Tune V-102 1st multi-plier ckt	American Steel Pack Co. #50-L special	48B220
C-106		CAPACITOR, variable: ceramic; 4 to 30 mmf; 500 vdcw; as per spec JAN-C-81	Ant. Series Trimmer	CV11C300	44J11C300
C-107		CAPACITOR, fixed: durez dipped ceramic; 5 mmf $\pm$ 0.5 mmf; 500 vdcw; as per spec JAN-C-20A; neg temp coeff 750 mmf/mfd/^{o}C	Temp compensation V-101 RF grid ckt	CC20UJ050D	
C-108		CAPACITOR, fixed: tubular ceramic; 1000 mmf GMV; 500 vdcw; 0.540 in. lg x 0.315 in. diam; phenolic insulation; 2 radial wire leads	Bypass tube V-101 AVC to ground	Centralab DA-505-033A	
C-109		Capacitor, fixed: same as C-108	Bypass tube V-101 cath-ode		
C-110		CAPACITOR, fixed: same as C-108	Bypass tube V-101 screen		
C-111		CAPACITOR, fixed: same as C-108	Bypass tube V-101 plate		

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec No.
C-112		CAPACITOR, fixed: same as C-107	Temp compensation tube V-101 RF plate ckt		
C-113		CAPACITOR, fixed: same as C-107	Temp compensation tube V-103 mixer grid ckt		
C-114		CAPACITOR, fixed: durez dipped ceramic; 24 mmf ± 10%; 500 vdcw; neg temp coeff 750 mmf/mfd/°C; as per spec JAN-C-20A	Isolate tube V-103 mixer grid tank ckt	CC20UK240K	
C-115		CAPACITOR, fixed: disc ceramic; 10,000 mmf + 80% - 20%; 450 vdcw; 19/32 in. diam x 0.156 in. thk; phenolic and wax insulation	Oscillator coupling	Centralab DA-048-003A	47A217
C-116		CAPACITOR, fixed: same as C-115.	Bypass tube V-103 screen		
C-117		CAPACITOR, fixed: durez dipped ceramic; 27 mmf ± 2%; 500 vdcw; neg temp coeff 220 mmf/mfd/°C; as per spec JAN-C-20A	Tune and temp compensate IF transf	CC20RH270G	
C-118		CAPACITOR, fixed: same as C-117	Tune and temp compensate IF transf		
C-119		CAPACITOR, fixed: same as C-115	IF transf bypass tube V-104 AVC to ground		
C-120		CAPACITOR, fixed: same as C-115	Bypass tube V-104 screen		
C-121		CAPACITOR, fixed: same as C-117	Tune and temp compensate IF transf		
C-122		CAPACITOR, fixed: same as C-117	Tune and temp compensate IF transf		
C-123		CAPACITOR, fixed: same as C-115	Bypass tube V-105 cathode		
C-124		CAPACITOR, fixed: same as C-115	Bypass tube V-105 screen		

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
C-125		CAPACITOR, fixed: same as C-117	Tune and temp compensate IF transf		
C-126		CAPACITOR, fixed: same as C-117	Tune and temp compensate IF transf		
C-127		CAPACITOR, fixed: durez dipped ceramic; 270 mmf ± 10%; 500 vdcw; as per spec JAN-C-20A; neg temp coeff 750 mmf/mfd/°C	RF bypass AF detector ckt	CC32UK271K	
C-128		CAPACITOR, fixed: same as C-108	Audio feedback tube V-106		
C-129		CAPACITOR, fixed: durez dipped ceramic; 100 mmf ± 10%; 500 vdcw; as per spec JAN-C-20A; neg temp coeff 750 mmf/mfd/°C	RF bypass plate V-106 1st audio	CC30UK101K	
C-130A C-130B		CAPACITOR, fixed: paper dielectric; oil filled; 2 section 0.25 x 0.25 mfd; 600 vdcw; as per spec JAN-C-25	C-130A fil filter C-130B dynomotor low volt filter	CP53B6DF254V	
C-131		CAPACITOR, fixed: same as C-115	Couple audio to pin 10 of P-101		
C-132		CAPACITOR, fixed: durez dipped ceramic; 75 mmf ± 10%; 500 vdcw; as per spec JAN-C-20A neg temp coeff 750 mmf/mfd/°C	Bypass grid #5 tube V-102 osc	CC30UK750K	
C-133		CAPACITOR, fixed: same as C-117	Couple osc plate to 1st multiplier ckt		
C-134		CAPACITOR, fixed: same as C-107	Temp compensation V-102 1st multiplier ckt		
C-135		CAPACITOR, fixed: durez dipped ceramic; 68 mmf ± 10%; 500 vdcw; as per spec JAN-C-20A; neg temp coeff 750 mmf/mfd/°C	Couple 1st multiplier ckt to grid	CC30UK680K	

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
C-136		CAPACITOR, fixed: same as C-107	Temp compensate V-102 2nd multiplier ckt		
C-137		CAPACITOR, fixed: same as C-108	Bypass tube V-102 plate ckts		
C-138		CAPACITOR, fixed: same as C-115	Bypass pin #5 V-107 rectifier cathode		
C-139		CAPACITOR, fixed: same as C-115	Bypass pin #1 V-107 rectifier cathode		
C-140		CAPACITOR, fixed: same as C-115	Bypass pin #5 V-108 rectifier cathode		
C-141		CAPACITOR, fixed: same as C-115	Bypass pin #5 V-108 rectifier cathode.		
C-142		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-143		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-144		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-145		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-146		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-147		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-148A C-148B		CAPACITOR, fixed: same as C-130	C-148A high voltage filter C-148B AVC filter		
C-149		CAPACITOR, fixed: same as C-115	Cable entry bypass		
C-150		CAPACITOR, fixed: same as C-115	Cable entry filter		

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
C-151		CAPACITOR, fixed: tubular ceramic; 2000 mmf GMV; 150 vdcw; 0.540 in. lg x 0.315 in. diam; phenolic insulation	Cable entry filter	Centralab DA-541-000A	47B20A202N1
C-152		CAPACITOR, fixed: same as C-151	Cable entry filter		
C-153		CAPACITOR, fixed: same as C-151	Cable entry filter		
C-154		CAPACITOR, fixed: same as C-151	Cable entry filter		
C-155		CAPACITOR, fixed: same as C-151	Cable entry filter		
C-156		CAPACITOR, fixed: same as C-151	Cable entry filter		
C-157		CAPACITOR, fixed: same as C-115	Fil filter		
C-158		CAPACITOR, fixed: same as C-115	Fil filter		
C-159		CAPACITOR, fixed: paper; 1.0 mfd; 400 vdcw as per spec JAN-C-25	High voltage filter	CP65B2DE105V	
C-160		CAPACITOR, fixed: durez dipped ceramic; 10 mmf $\pm$ 1.0 mmf; 500 vdcw; as per spec JAN-C-20A; neg temp coeff 750 mmf/mfd/^{o}C	Couple plate V-106 AVC diode to T-103	CC20UK100F	
C-161		CAPACITOR, fixed: same as C-151	Cable entry filter		
C-162		CAPACITOR, fixed: same as C-115	Cable entry filter		
C-163		CAPACITOR, fixed: same as C-115	Bypass high voltage supply at plate V-102		
C-164		CAPACITOR, fixed: same as C-115	Filament filter		
C-165		CAPACITOR, fixed: same as C-115	Filament filter		
C-166		CAPACITOR, fixed: same as C-115	Filament filter		
C-167		CAPACITOR, fixed: same as C-115	Filament filter		
D-101	3H1632A type DM-32-A	DYNAMOTOR: plate voltage supply; output 250 vdc, 60 ma; input 28 vdc, 1.1 amp	High voltage supply	Westinghouse #957972-A	20C041

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfg. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
E-101		BOARD, terminal: 5 brass cad plated solder terminals; board LTS-E-3 as per spec JAN-P-13; 2.343 in. lg x 13/16 in. wd x 5/8 in. h overall	V-101 and V-103 ckts		88B598
E-102		BOARD, terminal: 3 brass cad plated solder terminals; board LTS-E-3 as per spec JAN-P-13; 1-3/8 in. lg x 3/8 in. wd x 3/32 in. h overall	High voltage supply ckt		88A596
E-103		BOARD, terminal: same as E-102	AVC ckt		
E-104		BOARD, terminal: 5 copper hot tin dipped solder terminals; board LTS-E-3 as per JAN-P-13; 2-3/16 in. lg x 3/8 in. wd x 27/64 in. h overall; board impregnated as per spec JAN-C-173	Audio filter ckt		88A637
E-105		BOARD, terminal: same as E-102	V-102 ckt		
E-106		BOARD, terminal: 18 turret type solder lug terminals, 2 rows of 9 terminals each; phenolic board LTS-E-3 as per spec JAN-P-13; 2-3/4 in. lg x 1-1/2 in. wd x 3/32 in thk	Filter plate ckt		88B639
E-107		LUG, terminal: standoff; 1 brass silver plated terminal; low loss mica filled bakelite body; 7500 vdc insulation; 3/16 in. diam x 7/8 in. lg overall	V-102 B+ ckt		11A315
E-108		SHIELD, tube: Sig C #2Z8320-11; JAN type SOS6; steel round open top; mts by push turn slot at base; min ID 0.810 x max OD 7/8 in. x 1-3/4 in. lg; 0.014 in. thk stock; non magnetic stainless steel spring 5/8 in. h mounted inside at top; as per spec JAN-S-28 (Alt: TSFOT102 as per spec JAN-S-28A)	Retainer and shield for V-101, V-102, V-103, V-104, V-105; V-106, V-109, & V-110	SOS6	
E-109		SHIELD, tube: Sig C #2Z8320-10; JAN type SOS3; steel round open top; mts by push turn slot at base; min ID 0.810 x max OD 7/8 in. x 1-3/8 in. lg; 0.014 in. thk stock; non magnetic stainless steel spring 5/8 in. h mounted inside at top; as per spec JAN-S-28 (Alt: TSFOT101 as per spec JAN-S-28A)	Retainer and shield for V-107 and V-108	SOS3	
E-110		GUARD, antenna lead: plastic LTS-E-3 as per spec JAN-P-13; 7/8 in. lg x 11/32 in. wd x 3/32 in. thk; impregnated as per spec JAN-C-173; two mtg holes on 0.5 in mtg/C	Insulate antenna lead		8A943

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
E-111		INSULATOR, filter plate: rectangular; plastic LTS-E-3 as per spec JAN-P-13; 2-3/4 in. lg x 1-1/2 in. wd x 0.015 in thk; impregnated as per spec JAN-C-173; two 0.156 diam mtg holes on 1-3/4 in. mtg/C	Insulate term board E-106 from filter plate		8A1102
E-112		INSULATOR, filter plate cover: rectangular; plastic LTS-E-3 as per spec JAN-P-13; 2-11/16 in. lg x 2 in. wd x 0.015 in. thk; impregnated as per spec JAN-C-173; two 0.099 in. diam mtg holes on 1-3/4 in. mtg/C	Insulate terminal board E-106 from filter plate cover		8A1163
E-113		INSULATOR, spacing post: round; plastic LTS-E-1 as per spec JAN-P-13; 1/4 in. lg x 0.125 in. ID x 0.206 in. OD; impregnated as per spec JAN-C-173	Insulate C-106 from chassis		8A1166
E-114		STRAP, grounding: filter plate; beryllium copper strap 5-5/8 in. lg x 1/4 in. wd x 0.005 in. thk; two 0.144 in. diam connecting holes 5-1/4 in. /C; 0.00005 in. tin electroplate finish as per U.S. Army spec No. 72-53, table II type I	Ground filter plate to chassis		76A657
E-115		STRAP, ground: shock mount springs; approx 2-1/2 in. lg x 1/8 in. wd x 0.005 in. thk; beryllium copper strap with 0.00005 in. tin electroplate as per U.S. Army spec No. 72-53, table II type I	Electrically connect top cover to chassis		76A658-B
E-116		STRAP, ground: conical spring; 1-15/16 in. lg x 3/16 in. wd x 0.005 in. thk: beryllium copper strap with 0.00005 in. tin electroplate as per U.S. Army spec No. 72-53, table II type I	Electrically connect bottom cover to chassis		76A659
E-117		WASHER, extruded: 1/2 in. OD x 1/8 in. thk overall; 1/16 in. thk extrusion; 15/64 in. OD x 0.171 in. ID; plastic LTS-E-1 as per spec JAN-P-13; impregnated as per spec JAN-C-173	Insulate R-127, R-128, and R-129.		4A639
H-101		GROMMET, rubber: fits 13/16 in. diam hole; 1-1/16 in. OD x 11/16 in. ID x 15/64 in. thk	For meter jack (J-102)	Atlantic India Rubber works Inc. Part No. 95	16A199
H-102		GROMMET, rubber: fits 1/2 in. diam hole; 5/8 in. OD x 3/8 in. ID x 1/4 in. thk	Protect wire leads	Mayfair Molded Products Corp type 2142-B	16A200
H-103		GROMMET, chassis bumper: F-R neoprene; fits 5/16 in. diam hole; solid; diameter outside chassis 5/8 in., diam inside chassis 7/16 in. tapered to 1/4 in.; retainer groove	Vibration mount between chassis and case	Lavelle Rubber Co. Part No. 1195	16A198

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfg. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
H-104		COLLAR, conical spring: round brass body 11/16 in. OD x 0.046 in. thk; extrustion 0.218 in. OD x 0.156 in. ID x 9/64 in. thk overall; rectangular slit 0.218 in. lg x 0.062 in. wd x 0.046 in. thk; 0.00005 in. tin electroplate finish as per U.S. Army spec No. 72-53, table II type I	Ground conical shock mount spring		73A590
H-105		COLLAR: for spring H-108; brass body 0.312 in. diam x 3/32 in. thk overall; 0.234 in. diam x 1/16 in. wd extrusion; 0.062 in. x 0.156 in. slot to accommodate ground strap E-115; 0.00005 in. tin electroplate finish as per U.S. Army spec No. 72-53, table II type I	Retain shock mount spring		73A589-B
H-106		SLEEVE, plastic: shock mount; 13/32 in. lg x 5/16 in. ID x 0.025 ± 0.003 in. thk	Limit travel of shock mount spring	Robinson Aviation Inc. R 3736A	8A1167
H-107		SLEEVE, plastic: fits over E-115; ID max 0.101 in. ID min 0.091 in. nominal ID 0.095 in.; 0.025 in. ± 0.003 in. thk; four identifying ridges equally spaced around circumference, running length of sleeve	Insulate H-108 from E-115	National Varnish & Products Corp. Natvar No. 400 (UL approved)	65A547
H-108		SPRING, shockmount: 16-1/2 turns; stainless steel wire, type 302; 1-3/16 in. free length x 0.310 in. OD; 0.039 in. diam wire; ends squared and ground	Shock mount between chassis and top cover		75A182
H-109		SPRING, conical: 0.052 in. diam stainless steel wire, type 302; 7-1/2 turns; free length 23/32 in. lg x 1-1/6 in. OD large end x 0.218 in. ID small end	Shock mount between chassis and bottom cover		75A183
H-110		RETAINER, shock mount holder: CRS 0.047 in. thk; flat square 1 in. diag base with 3/16 in. wd ear formed at each corner; two 0.218 in. diam mtg holes at 0.5 in./C; ears 5/64 in. h inside and turned 90° towards center for 1/8 in.	Hold complete shock mount assemblies in place		76B584-B
H-111		PLUG, button: 8 prong brass; fits 1/2 in. hole; 21/32 in. OD x 5/64 in. h top x 13/64 in. h overall; black wrinkle finish	Plug control adjustment holes	Cinch Mfg. Co. Part #48137	17A001

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfg. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
H-112		ALIGNMENT TOOL: extra heavy fibre body 7/16 in. OD x 5 in. lg; inside 1/4 in. hex broached the entire length; special tough fibre 1/4 in. diam rod inside beveled at each end to form screw driver blades; position adjustable by means of set screw; 7 in. lg overall	Adjust antenna trimmer	Bud Radio Inc. type #AT-236	33B381
H-113		WRENCH, Allen: hard steel; 0.062 in. hex shaped; cad plate as per spec 100M001H; to fit #6 Allen head set screw.	Tighten drive gear and dial set screws		33A169-D
H-114		CLIP, screw worm spring: 0.032 in. diam stainless steel spring wire type 410; two 0.093 in. ID loops 11/64 in. apart, then pinched together to make a 1/32 min and 1/16 in. max opening at ends; 90^{O} hook formed at one end of spring to prevent its rotation	Retain O-101		76A468
H-115		CLIP, crystal mounting: 1/4 in. wd x 0.031 in. thk beryllium copper; cad plated as per spec AN-P-61, type I amendment 2; 3/8 in. straight then bent 90^{O} with 1/16 in. rad; straight for approx 5/16 in. then bent same direction for approx 1/2 in. on 3/8 in. rad; reverse bent until perpendicular with start; straight for 5/32 in. then reverse bent at 45^{O}; lg overall 15/16 in. x 3/8 in. h; one 0.120 diam mtg hole	Retain Y-101 crystal		76A469
H-116		CLAMP, cable: 0.059 in. CRS 1/4 in. wd; flat 1/4 in. then curved with 3/16 in. inside rad curved at 1/8 in. above center with 1/16 in. outside rad; center to curved end 5/16 in., center to flat end 1/2 in.; 0.125 in. diam mtg hole in flat end; cad plated as per U.S. Army spec No. 72-53, table II type I; black wrinkle finish as per table I type I	Clamp output cable to filter plate		76B471
H-117		WASHER, spring: 0.008 in. phosphor bronze cad plated as per spec AN-P-61, type I amendment 2; 3/16 in. ID x 3/8 in. OD before forming; 5/64 in. wd after forming	Used with H-114 to retain tension on O-101	Shakeproof Inc. 3502-10-1	4A372
H-118		WASHER, flat: 1/32 in. thk x 3/8 in. OD x 5/32 in. ID; plastic LTS-E-1 as per spec JAN-P-13; impregnated as per spec JAN-C-173	Cushion ceramic coil forms		4A641
H-119		WASHER, flat: 0.032 in. thk x 3/8 in. OD x 0.172 in. ID; cad plated steel; standard commercial type size 8	Prevent play in O-101		4AXFV

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
H-120		CUP, shock mount: brass; bell shaped body 0.593 in. lg overall, bell portion 0.406 in. lg; flared from 23/64 in. to 7/16 in.; 0.00005 in. tin electroplate as per U. S. Army spec 72-53, table II type I	Fit over shock mount springs (mounted inside top cover)		76A610-B
H-121		ABSORBER, shock: neoprene or rubber; fits 1 in. diam x 5/64 in. h shock mount; tapers from 21/32 in. diam to 7/16 in. diam; taper 21/64 in. lg; 13/32 in. lg overall; 5/16 in. ID	Hold shock mount springs (mounted in H-110)	Robinson Aviation Inc. Std 1481A	16A207
J-101		CONNECTOR, female contact: 10 rectangular female contacts; straight type; polarized; 1-9/16 in. lg x 11/16 in. wd x 1-9/16 in. h including cable clamp; phenolic body protected by rectangular formed black wrinkle finished shell; cable clamp in end for 1/2 in. max OD cable	Socket for P-101	H. B. Jones S-310-CCT	10A348
J-102		JACK, telephone: Sig C #2Z5531.2; for 2 cond 0.25 in. diam plug; 1-19/32 in. lg x 5/8 in. wd x 1-13/16 in. h overall; J4 contact arrangement; includes 1 hex nut and 1 washer; 3/8 in. mtg hole	For relay meter plug	Mallory A2A	36A043
K-101		RELAY, armature: dual; in hermetically sealed can; one set SPDT one set SPST normally closed contacts per relay; contact rating 0.5 amp 24 vdc; coils single winding type; operating current 3.5 ma; release current 2 ma; DC coil resistance 10,000 ohms; solid wire terminals sealed in glass header; 3-1/16 in. lg x 1-3/16 in. wd x 2-1/2 in. h overall; entire unit hermetically sealed in metallic can; gray lacquer finish; Army Air Force spec 71-854-A	Pitch control relay	Potter & Brumfield type MT-1179-2	21G091-C
K-102		RELAY, armature: same as K-101	Azimuth control relay		
L-101		COIL, RF: antenna; integral type; single winding; single layer wound; 4 turns #20 tinned copper wire; unshielded; 1-33/64 in. lg x 3/8 in. OD ceramic grooved form	Antenna tuned circuit		51B1133
L-102A		COIL, R F plate: integral type; single winding; single layer wound; 5 turns #20 tinned copper wire, unshielded; 2-23/64 in. lg x 3/8 in. diam ceramic grooved form	RF plate tuned circuit V-101		51B1134

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfg. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
L-102B		COIL, RF: mixer grid; integral type; single winding; single layer wound; 4 turns #20 tinned copper wire; unshielded; wound on form with L-102A; part of 51B1134	Mixer grid tuned circuit V-102		
L-103A L-103B L-103C		COIL, RF: pick up tripler and oscillator coils; three winding; integral type; L-103A, two turns insulated #20 wire wound on small end of form; L-103B, six turns #20 tinned copper wire wound on small end of form; L-103C, eight turns #20 tinned copper wire tapped at 3-1/4 turns, wound on large end of form; unshielded ceramic grooved form; 2-13/64 in. lg x 3/8 in. diam small end x 29/32 in. diam large end	L-103A couples V-102 cathode to oscillator. L-103B, 2nd L-103C, 1st multiplier tuned ckts		51B1135
L-104		COIL, RF: choke; 2 pie windings; universal wound, 70 turns #38SSE wire per pi; unshielded; start of winding indicated by paint spot; 7.8 ohms; 80 microhenries	RF filter plate V-106		53B168
L-105		COIL, choke; single winding; single layer wound; unshielded; 47 turns #30 enamel copper wire; 3/4 in. lg x 3/16 in. diam overall, less leads; 0.28 ohms; 3.4 microhenries	Fil filter		53B170
L-106		Coil, choke: same as L-105	Fil filter		
L-107		Coil, choke: same as L-105	Fil filter		
L-108		Coil, choke: same as L-105	Fil filter		
L-109		Coil, choke: same as L-105	High voltage supply filter		
L-110		Coil, RF: choke; same as L-104	High voltage filter plate V-102		
L-111		COIL, choke: single winding; single layer wound; unshielded; 25 turns #24 enamel copper wire; 3/4 in. lg x 1/4 in. diam less leads, 0.04 ohms; 0.86 microhenries	Pitch center circuit filter (K-101 non operative)		53B187
L-112		COIL, choke: same as L-111	Azimuth center circuit filter (K-102 non-operative)		

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
L-113		COIL, choke: same as L-111	Cable entry filter		
L-114		COIL, choke: same as L-111	Cable entry filter		
L-115		COIL, choke: same as L-111	Cable entry filter		
L-116		COIL, choke: same as L-111	Cable entry filter		
L-117		COIL, choke: same as L-111	Cable entry filter		
L-118		COIL, choke: same as L-111	Cable entry filter		
L-119		COIL, choke: same as L-111	Cable entry filter		
L-120		COIL, choke: same as L-111	Cable entry filter		
L-121		COIL, choke: same as L-111	Cable entry filter		
L-122		COIL, choke: same as L-105	Filter V-102 osc/multi-plier fil		
L-123		COIL, choke: same as L-105	Filter V-102 osc/multi-plier fil		
O-101		WORM, screw: brass rod; cad plated with min thickness of 0.0003 in. as per spec AN-P-61, type I amendment II; 1-3/4 in. lg overall; 5/8 in. lg x 1/4-20NC2 thread; slotted head 0.248/0.250 in. diam	For tuning drive		26A059-C
O-102		DIAL, calibrated fixed: RF grid; 19/32 in. h x 1 in. diam 1/4 in. lg with dial calibrated 0-2-4-6-8-10,; 0.5 in. diam with 1/8 in. lg x 0.5790 in. diam gear on end; to fit 0.381 in. /0.382 in. diam shaft; gear has 40 teeth 0.031 in. deep at 60^{0} included angle; decal #31B743	Dial and drive gear for C-101		77B333
O-103		DIAL, calibrated fixed: mixer grid and RF plate; same as O-102 except that decal is calibrated A-B-C-D-E; decal #31B742	Dial and drive gear for C-102 and C-103		

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
O-104		DIAL, calibrated fixed: 2nd multiplier ckt; same as O-103 except for spacing of letters on dial; decal #31B744	Dial and drive gear for C-104		
O-105		DIAL, calibrated fixed: 1st multiplier ckt; same as O-103 except for spacing of letters on dial; decal #31B745	Dial and drive gear for C-105		
P-101		CONNECTOR, male: Sig C #2Z7120.3; 10 rectangular male contacts 3/8 in. lg; straight type; polarized; 11/16 in. wd x 1-9/16 in. h x 1-5/8 in. lg including cable clamp but less contacts; phenolic body protected by rectangular formed metallic black wrinkle finished shell; cable clamp in end for 1/2 in. max OD cable	Receiver output connector	H.B.Jones P-310-CCT	10A343
R-101		RESISTOR, fixed: composition; 470,000 ohms ± 10%; 1/2 w; as per spec JAN-R-11	AVC filter	RC20BF474K	
R-102		RESISTOR, fixed: composition; 220 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Cathode bias for V-101	RC20BF221K	
R-103		RESISTOR, fixed; composition; 22,000 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Screen dropping resistor for V-101	RC20BF223K	
R-104		RESISTOR, fixed: composition; 2200 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Plate dropping resistor for V-101	RC20BF222K	
R-105		RESISTOR, fixed: composition; 100,000 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Mixer grid leak	RC20BF104K	
R-106		RESISTOR, fixed; composition; 1800 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Cathode bias for V-103	RC20BF182K	
R-107		RESISTOR, fixed; composition; 3900 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Plate dropping resistor for V-103	RC20BF392K	
R-108		RESISTOR, fixed: same as R-101	AVC filter for V-104		

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
R-109		RESISTOR, fixed: composition; 1000 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Plate dropping resistor for V-104	RC20BF102K	
R-110		RESISTOR, fixed: composition; 82 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Cathode bias for V-105	RC20BF820K	
R-111		RESISTOR, variable: 5000 ohms ± 20%; 1/4 w; 3 terminals; body 1 in. diam x 29/64 in. thk; slotted shaft 0.375 in. lg x 0.250 in. diam; spec requirements JAN-C-173; B taper	Sensitivity control (cathode bias for V-105)	Chicago Tel. Supply #F1317 type HT-45	25B837
R-112		RESISTOR, fixed: composition; 220,000 ohms ± 10%; 1/2 w; as per spec JAN-R-11	Voltage divider for bias on V-105	RC20BF224K	
R-113		RESISTOR, fixed: same as R-109	Plate dropping resistor for V-105		
R-114		RESISTOR, fixed: same as R-105	IF filter V-106 detector circuit		
R-115		RESISTOR, fixed: composition; 2700 ohms ± 10%; 1/2 w. as per spec JAN-R-11	Cathode bias for V-106 AVC diode and audio amp	RC20BF272K	
R-116		RESISTOR, fixed: composition; 22,000 ohms ± 10%; 1 w; as per spec JAN-R-11	Plate load resistor for V-106	RC30BF223K	
R-117		RESISTOR, fixed: composition; 2.2 megohms ± 10%; 1/2 w; as per spec JAN-R-11	AVC voltage dropping resistor	RC20BF225K	
R-118		RESISTOR, fixed: same as R-117	AVC filter resistor		
R-119		RESISTOR, fixed: composition; 68,000 ohms ± 10%; 1/2 w; as per spec JAN-R-11.	Pin #5 grid resistor V-102	RC20BF683K	

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
R-120		RESISTOR, fixed; same as R-119	Pin #6 grid resistor V-102		
R-121		RESISTOR, fixed: same as R-104	Plate dropping resistor for V-102		
R-122		RESISTOR, fixed: same as R-117	Load resistor pin #5 V-107 and grid resistor pin #5 V-109		
R-123		RESISTOR, fixed: same as R-117	Load resistor pin #1 V-107 and grid resistor pin #6 V-109		
R-124		RESISTOR, fixed: same as R-117	Load resistor pin #5 V-108 and grid resistor pin #5 V-110		
R-125		RESISTOR, fixed: same as R-117	Load resistor pin #1 V-109 and grid resistor pin #6 V-110		
R-126		RESISTOR, fixed: same as R-102	Meter shunt		
R-127		RESISTOR, fixed: WW; 1600 ohms; 10 w; as per spec JAN-R-26A	High voltage supply filter	RW31F162	
R-128		RESISTOR, fixed: WW; 2 ohms; 8 w; as per spec JAN-R-26A	Fil voltage dropping	RW30F2R0	
R-129		RESISTOR, fixed: WW; 40 ohms; 2 w; as per spec. JAN-R-26	Fil shunt	RW30E400	

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
T-101		TRANSFORMER, IF: 15 mc; shielded; 2-1/16 in. lg x 0.75 in. sq shield can; ceramic form; double tuned; primary and secondary fixed tuned by C-117 and C-118; adj iron core for both pri and sec; pri shunt capacity 6 mmf, sec shunt capacity 9 mmf	IF tuned ckt		50C429-D
T-102		TRANSFORMER, IF: same as T-101; (includes C-121 and C-122)	IF tuned ckt		
T-103		TRANSFORMER, IF: same as T-101; (includes C-125 and C-126)	IF tuned ckt		
V-101		TUBE, electron: Sig C #2J6AG5; as per spec JAN-1A	RF amplifier	JAN-6AG5	
V-102		TUBE, electron; Sig C #2J6J6; as per spec JAN-1A	Osc/ multiplier	JAN-6J6	
V-103		TUBE, electron: same as V-101	Mixer		
V-104		TUBE, electron: Sig C #2J6AU6; as per spec. JAN-1A	1st IF amplifier	JAN-6AU6	
V-105		TUBE, electron: same as V-104	2nd IF amplifier		
V-106		TUBE, electron; Sig C #2J6BF6; as per spec JAN-1A	Detector, DAVC, and 1st audio	JAN-6BF6	
V-107		TUBE, electron: Sig C #2J6AL5; as per spec JAN-1A	755 cps and 1900 cps rectifier	JAN-6AL5	
V-108		TUBE, electron: same as V-107	475 cps and 3000 cps rectifier		
V-109		TUBE, electron: same as V-102	Pitch relay control		
V-110		TUBE, electron: same as V-102	Azimuth relay control		
X-101		SOCKET, tube: 7 contact miniature; one piece saddle mtg; two 1/8 in. diam mtg holes on 7/8 in. mtg/C; round ceramic body 1-9/32 in. lg including lug x 0.805 in. diam,; unmarked, silver plated, beryllium copper contacts; metal shock shield and center shield 0.095 in. ID; as per spec JAN-S-28. (Alt: TSE7T102 as per spec JAN-S-28A	RF amplifier tube socket	SO10C	

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
X-102		SOCKET, tube: same as X-101	Osc/multiplier tube socket		
X-103		SOCKET, tube: same as X-101	Mixer tube socket		
X-104		SOCKET, tube: same as X-101	1st IF amplifier tube socket		
X-105		SOCKET, tube: same as X-101	2nd IF amplifier tube socket		
X-106		SOCKET, tube: same as X-101	Detector, DAVC, and 1st audio amplifier tube socket		
X-107		SOCKET, tube; 7 contact miniature; one piece saddle mtg; steel shell; two 0.125 in. diam mtg holes on 7/8 in. mtg/C; round moulded plastic body 0.625 in. diam; unmarked, silver plated, beryllium copper contacts; metal shock shield and center shield 0.095 in. ID; as per spec JAN-S-28 (Alt: TSE7T101 as per spec JAN-S-28A)	Rectifier tube socket	SO10M	
X-108		SOCKET, tube: same as X-107	Rectifier tube socket		
X-109		SOCKET, tube: same as X-107	Pitch relay control tube socket		
X-110		SOCKET, tube: same as X-107	Azimuth relay control tube socket		
X-111		SOCKET, crystal: Sig C #2Z3063-48; two, round, female, phosphor bronze, silver plated contacts; straight type; glazed ceramic body; 1-3/8 in. lg x 15/32 in. wd x 3/4 in. thk including term; rectangular with rounded corners	Osc crystal socket	Millen #K-33202	6A325

TABLE OF REPLACEABLE PARTS (Cont.)

MODEL: RADIO RECEIVING SET AN/CRW-7 MAJOR ASSEMBLY: RADIO RECEIVER R-150A/CRW-7

Reference Symbol	Army Stock No. Navy Stock No.	Name of Part and Description	Function	Mfr. & Desig. or JAN Type	Cont. or Govt. dwg. or Spec. No.
Z-101		FILTER, bandpass: four channels; mid-frequency channel #1 475 cps, #2 755 cps, #3 1900 cps, and #4 3000 cps; bandpass of each channel is such that the response at ± 8% from the mid-frequency is not more than 3 db from mid-frequency response; 2-3/8 in. lg x 2-1/2 in. wd x 3-47/64 in. h excluding brkt; shock mount spotwelded to side of can; input impedance 6000 ohms; output impedance of each channel 1 megohm	Divide signal output into 4 channels	Chicago transformer #13889	56G103-C

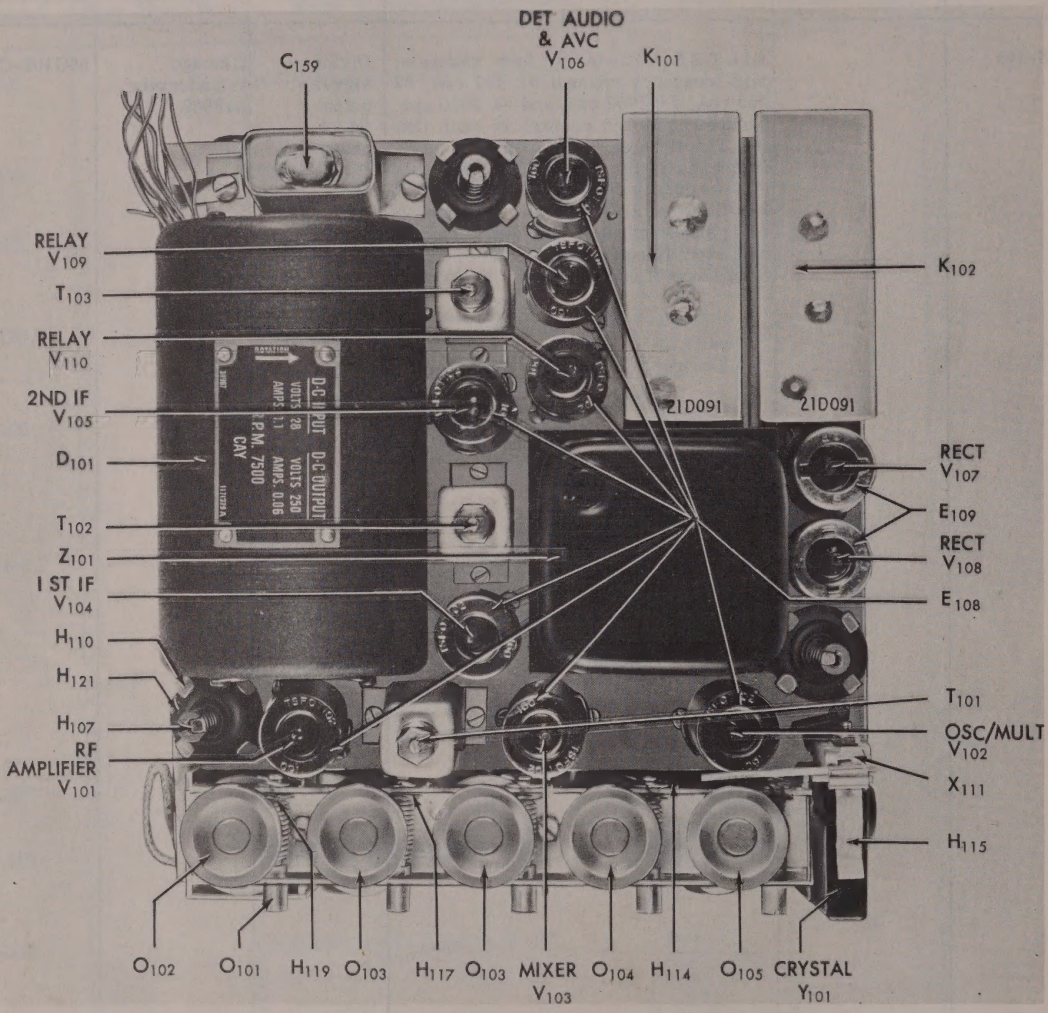


Figure 8-1. Radio Receiver R-150A/CRW-7 - Top View of Chassis Showing Location of Parts

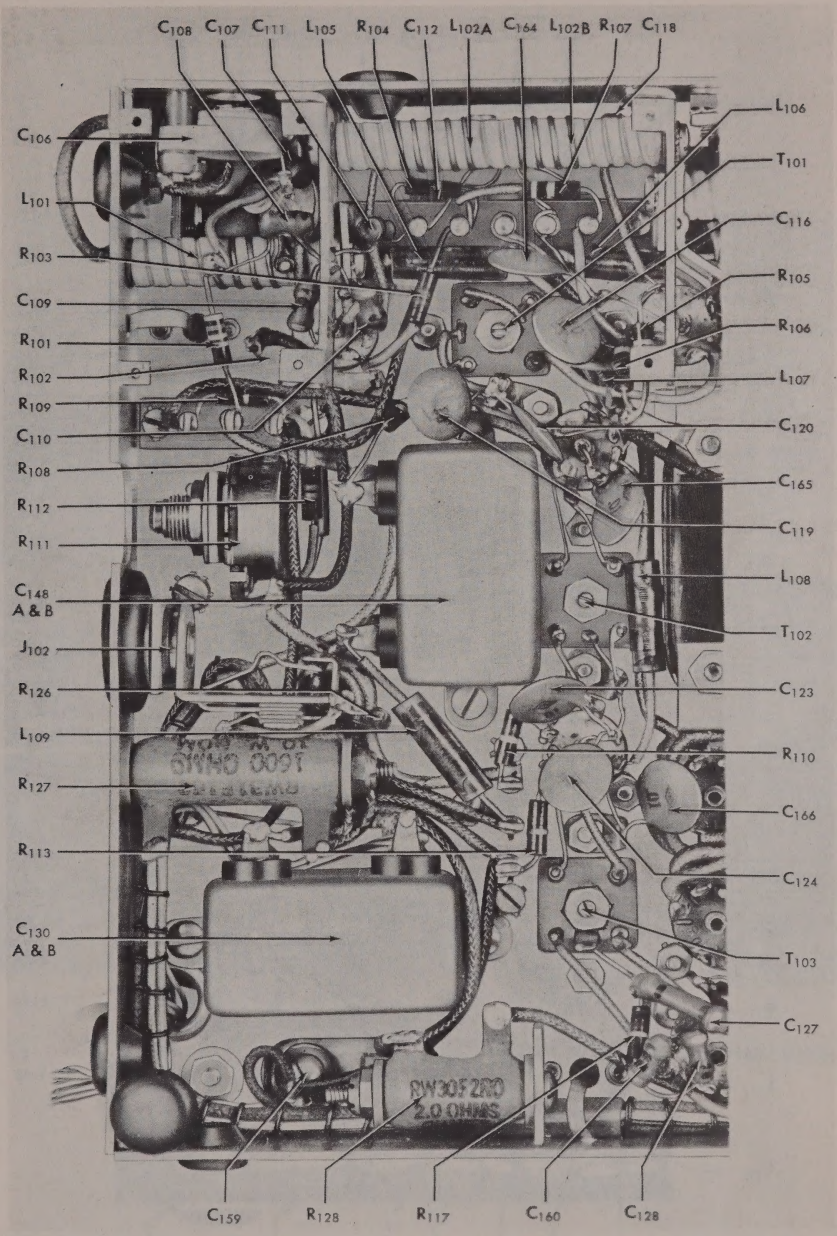


Figure 8-2. Radio Receiver R-150A/CRW-7 - Bottom View of Chassis Showing Parts Location in Left Half

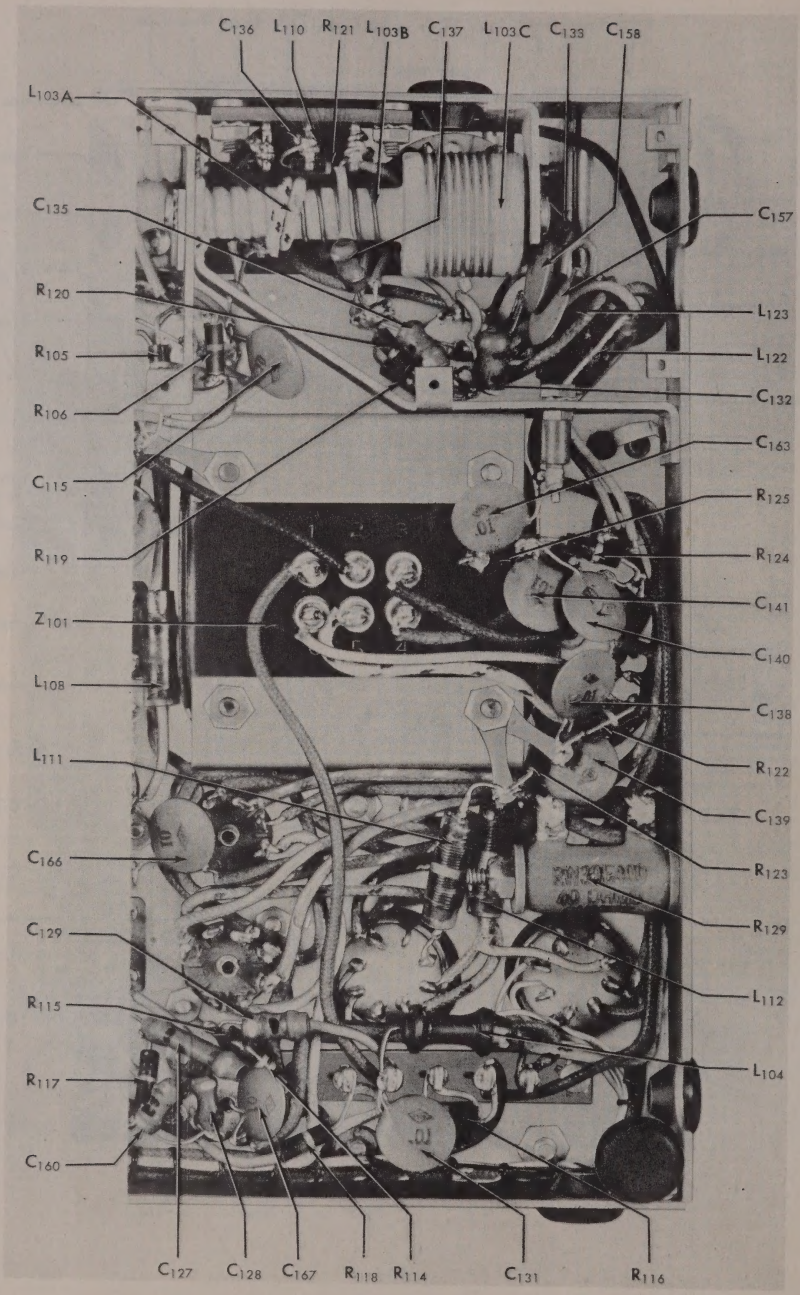


Figure 8-3. Radio Receiver R-150A/CRW-7 - Bottom View of Chassis Showing Parts Location in Right Half

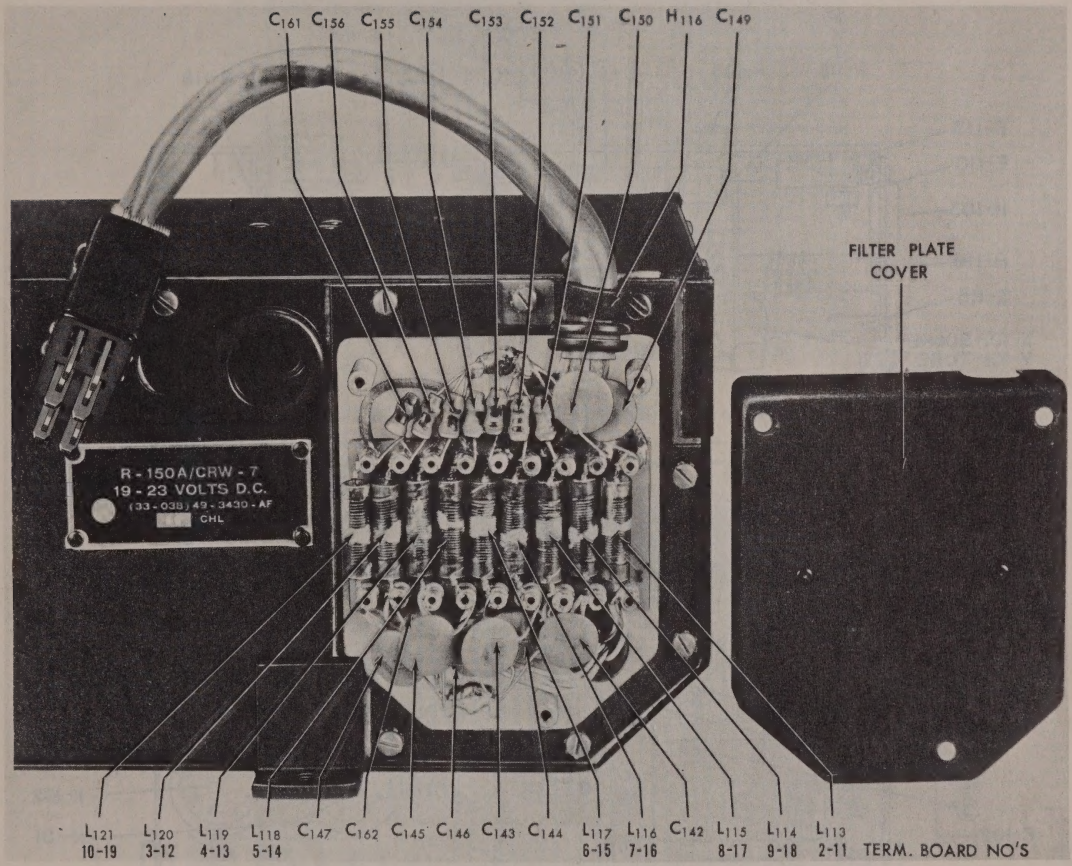


Figure 8-4. Radio Receiver R-150A/CRW-7 - Filter Plate with Cover Removed

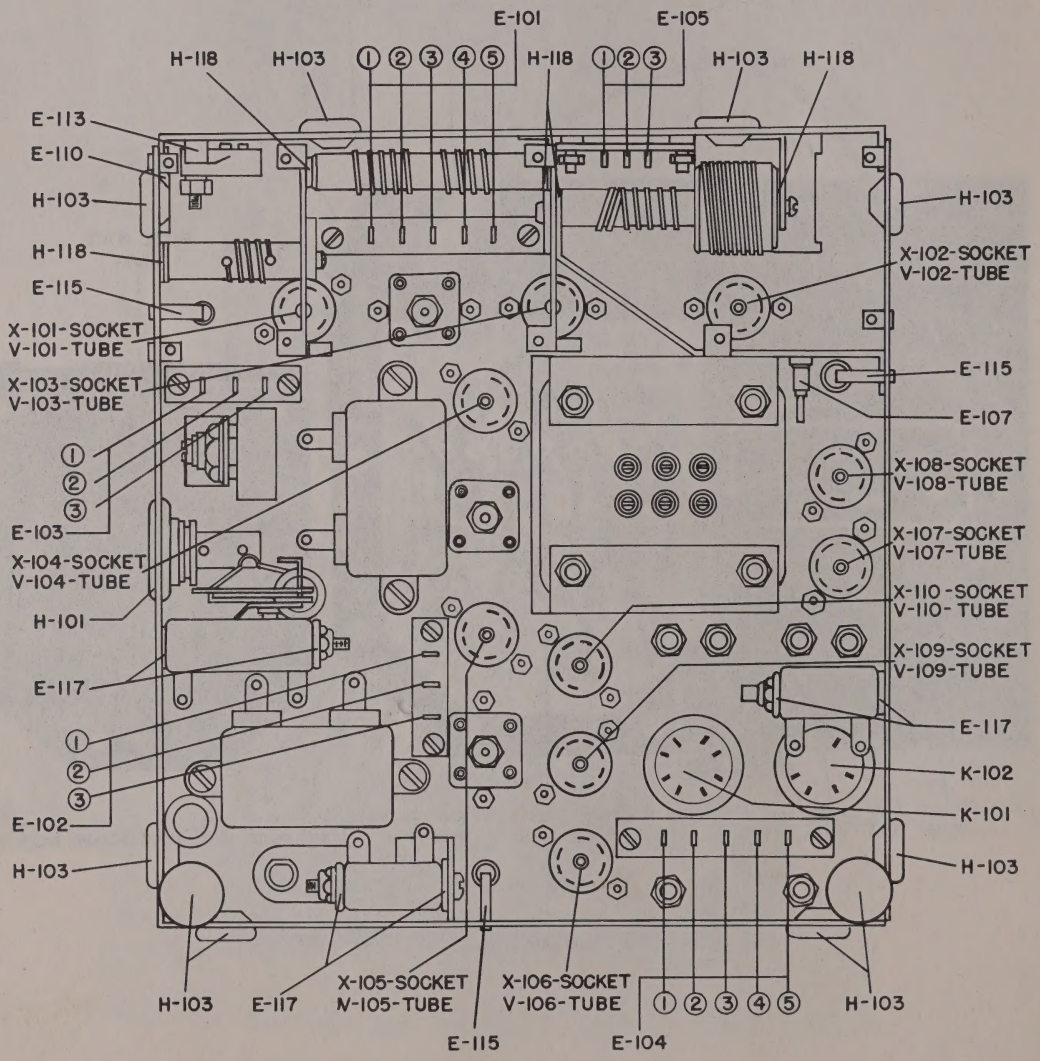


Figure 8-5. Radio Receiver R-150A/CRW-7 - Bottom View Showing Location of Replaceable Parts

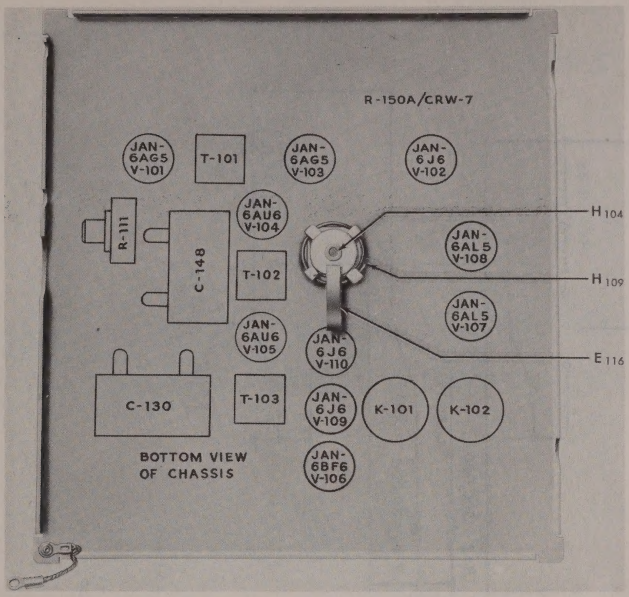


Figure 8-6. Radio Receiver R-150A/CRW-7 - Inside View of Cover Plate

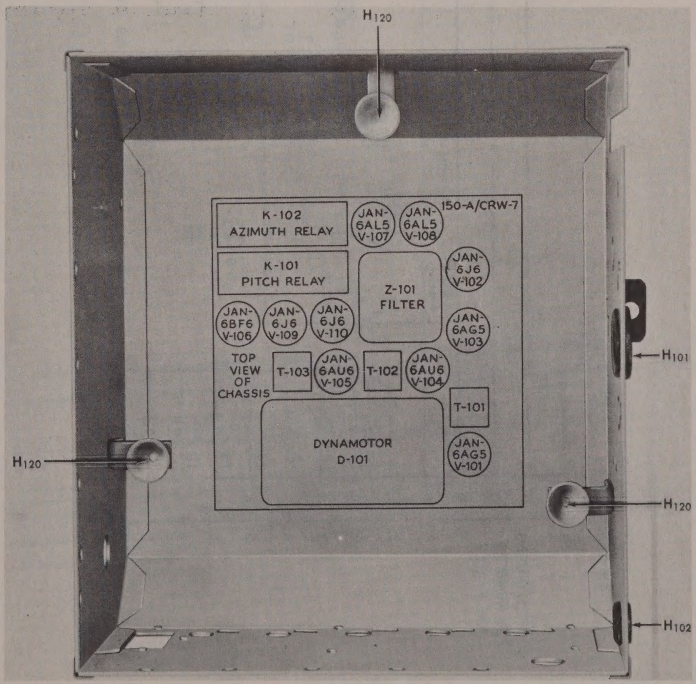


Figure 8-7. Radio Receiver R-150A/CRW-7 - Inside View of Top Cover

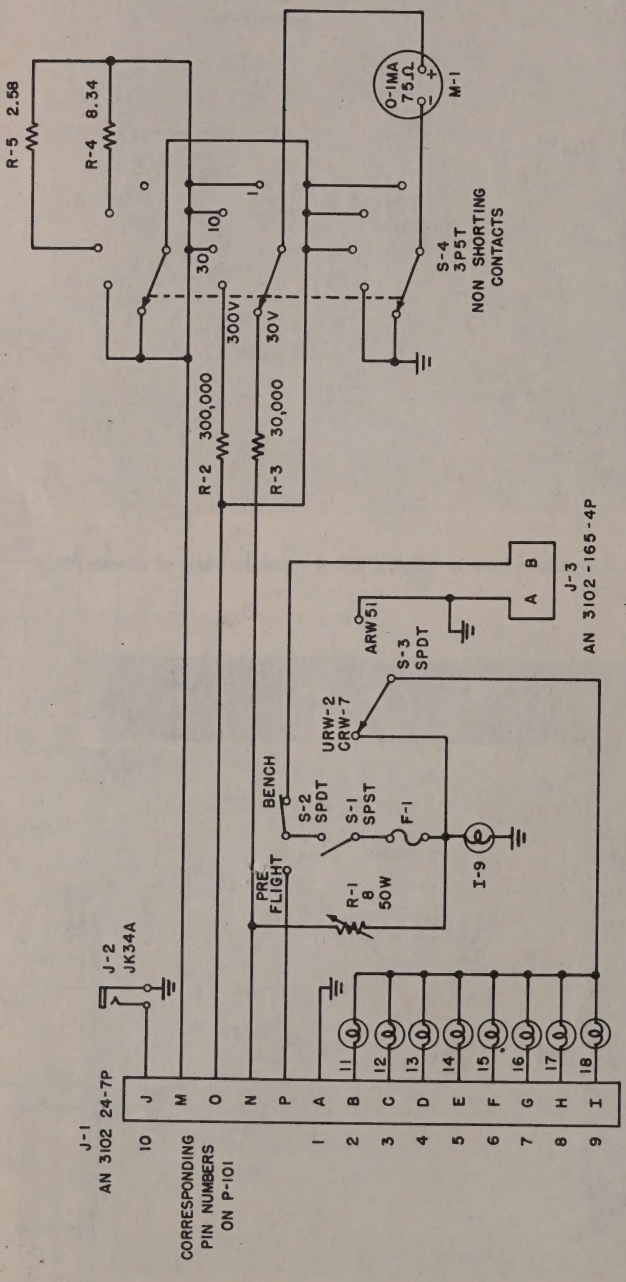


Figure 8-8. Relay Test Set TS-604/U - Wiring Diagram - Schematic

T. O. NO. 16-55-151

RADIO, RADAR AND ELECTRONICS SPARE PARTS LIST

FOR

AN/CRW-7

(INCLUDING APPENDICES "A" AND "ARMY")

In this list the first numeral appearing in the page number indicates the section and the second numeral indicates the page number of that section.

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WF-5-2-45-11,400

15 JANUARY 1945

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COMPONENTS PARTS LIST
FOR
RADIO RECEIVING SET AN/CRW-7

Assembly	Sig C Stock Numbers
1. Radio Receiver R-150/CRW-7	See Note
2. Mounting MT-415/CRW-7	See Note
3. Connector, female contact Jones S-310-CCT	See Note
4. Crystal Unit CR-1A/AR	See Note

NOTE: Stock numbers for these items not yet available.

RADIO, RADAR AND ELECTRONICS SPARE PARTS LIST FOR RADIO RECEIVING SET AN/CRW-7

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Item No.	*Reference Symbols*	*Quantity (See Notes)*	*Name of Part, Description and Equipment Contractor's Part Number, If Available*
1	E-107	1	BOARD, terminal: 6 brass cadmium plated solder terminals; XXXP bakelite; 2-15/16" lg x 3/4" wd x 3/32" thk; Delco No. A-7254466.
2	E-106	1	BOARD, terminal: 1 brass cadmium plated solder terminal; XXXP bakelite; 15/32" lg x 5/8" wd x 3/32" thk; Delco No. A-7254455.
3	E-105	1	BOARD, terminal: 8 brass cadmium plated solder terminals; XXXP bakelite; 1-15/16" lg x 3/4" wd x 7/16" thk; Delco No. A-7254257.
4	E-104	1	BOARD, terminal: 6 brass cadmium plated solder terminals; XXXP bakelite; 2-15/16" lg x 3/4" wd x 3/32" thk; Delco No. A-7564256.
5	E-103	1	BOARD, terminal: 5 brass cadmium plated solder terminals; XXXP bakelite; 2¼" lg x 3/8" wd x 3/32" thk; Delco No. A-7254255.
6	E-102	1	BOARD, terminal: 4 brass cadmium plated solder terminals; XXXP bakelite; 7/8" lg x 3/4" wd x 3/32" thk; Delco No. A-7254254.
7	E-101	1	BOARD, terminal: 3 brass cadmium plated solder terminals; XXXP bakelite; 1.125" lg x 3/8" wd x 3/32" thk; Delco No. A-7254253.
8	C-107, C-112, C-113, C-139, C-144	7	CAPACITOR, fixed: ceramic; 5 mmf ± 1/2 mmf; 500 vdcw; Delco No. B-7254440.
9	C-138	2	CAPACITOR, fixed: ceramic; 15 mmf ± 10%; 500 vdcw; Delco No. B-7254204.
10	C-126	2	CAPACITOR, fixed; ceramic; 24 mmf ± 5%; 500 vdcw; Delco No. B-7254206.
11	C-110, C-111	3	CAPACITOR, fixed: mica; 100 mmf ± 5%; 500 vdcw; Delco No. B-7245010.
12	C-149, thru C-156	7	CAPACITOR, fixed: mica; 300 mmf ± 20%; 500 vdcw; Delco No. A-7254482.
13	C-128, C-135	3	CAPACITOR, fixed: mica; 320 mmf ± 10%; 500 vdcw; Delco No. A-7254212.
14	C-108, C-109	3	CAPACITOR, fixed: mica; 1000 mmf ± 10%; 300 vdcw; Delco No. A-7254210.
15	C-131, C-140, C-145	5	CAPACITOR, fixed: mica; 1000 mmf ± 20%; 300 vdcw; Delco No. B-7247288.
16	C-114, C-118, C-122, C-123, C-129, C-136 C-141, C-148, C-157 thru C-162	10	CAPACITOR, fixed: paper; 10,000 mmf ±20%; 120 vdcw; Delco No. A-7253928.
17	C-115, C-119, C-124, C-137, C-142, C-143	10	CAPACITOR, fixed: paper; 3000 mmf ± 20%; 200 vdcw; Delco No. A-7254209.
18	C-132	4	CAPACITOR, fixed: paper; 10,000 mmf ± 20%; 300 vdcw; Delco No. A-7254213.
19	C-146	2	CAPACITOR, fixed: paper; 1 mf + 20% — 10%; 400 vdcw; Delco No. A-7254146.
20	C-133-A, -B, C-134-A, -B	3	CAPACITOR, fixed: paper; 2 section; 100,000 mmf; 400 vdcw; Delco No. A-7254458.
21	C-130-A, -B	3	CAPACITOR, fixed: paper; 2 section; 250,000 mmf + 20% — 15%; 400 vdcw; Delco No. A-7254431.
22	C-106	1	CAPACITOR, variable: ceramic; test; 1-5/32" lg x 5/8" wd x 3/8" h; Delco No. A-7254528. (3 to 30 mmf; 500 vdcw; 1300 vdc).
23	C-102	1	CAPACITOR, variable: air dielectric; 4 to 34.8 mmf; 1-15/16" lg x 15/16" wd x 1-7/32" h; 12 plates; Delco No. A-7254172.
24	C-103	1	CAPACITOR, variable: air dielectric; 4 to 34.8 mmf; 1-15/16" lg x 15/16" wd x 1-7/32" h; 12 plates; Delco No. A-7254173.

Item No.	*Reference Symbols*	*Quantity (See Notes)*	*Name of Part, Description and Equipment Contractor's Part Number, If Available*
25	C-1031, C-104	2	CAPACITOR, variable: air dielectric; 4.8 to 49.6 mmf; 2-1/16" lg x 15/16" wd x 1-7/32" h; 17 plates; Delco No. A-7254174.
26	C-105	1	CAPACITOR, variable: air dielectric; 4.8 to 49.6 mmf; 2-1/16" lg x 15/16" wd x 1-7/32" h; 17 plates; Delco No. A-7254474.
27	L-101	2	COIL, radio, RF: antenna; integral type; single winding; single layer wound; unshielded; 1-3/4" lg x 3/8" OD; 4 turns No. 20 AWG wire; Delco No. B-7254490.
28	L-102-A, L-102-B	2	COIL, radio, RF: integral type; two windings; single layer wound; No. 20 tinned copper wire; 2-23/64" lg x 3/8" dia; Delco No. B-7254491.
29	L-104 through L-108	7	(29-A) COIL, radio, RF: choke; integral type; single winding; single layer wound; unshielded; No. 32 AWG wire; Delco No. A-7254481. OR (29-B) COIL, radio, RF: choke; integral type; single winding; 80 turns No. 32 enameled copper wire; shielded; Delco No. A-7254523.
30	L-109	2	COIL, radio, RF: choke; integral type; 2 pie winding; universal wound; unshielded; 70 turns No. 38 AWG wire per pie; Delco No. A-7253929.
31	L-103-A through L-103-B	2	COIL, radio, RF: oscillator; integral type; 3 single layer windings; single wound; unshielded; 2-13/64" lg x 3/8" dia on small end and 29/32" dia on large end; Delco No. B-7254489.
32	O-101	2	COLLAR, antenna trimmer spacer: paper base bakelite; 1/4" lg x 1/4" OD x .125 ID; tropicalized; Delco No. A-7254550.
33	J-101	2	CONNECTOR, female contact: 10 rectangular female contacts; 1-9/16" lg x 1-9/16" wd overall; HB Jones No. S-310-CCT; Delco No. A-7254366.
34	P-101	2	CONNECTOR, male contact: 10 rectangular flat type contacts; straight; 1-31/32" lg x 1-9/16" wd overall; HB Jones No. P-310-CCT; Delco No. A-7254364.
35	O-102	1	DIAL ASSEMBLY, calibrated: antenna; dial decal calibrated 0, 2, 4, 6, 8, 10; gear and hub; two No. 6-32 set screws; Delco No. A-7254568.
36	O-103	2	DIAL ASSEMBLY, calibrated: converter grid and RF plate; 19/32" h x 1" dia overall; consists of dial decal calibrated A, B, C, D, E; gear and hub; two set screws; Delco No. A-7254572.
37	O-104	1	DIAL ASSEMBLY, calibrated: oscillator; 19/32" h x 1" dia overall; consisting of dial decal calibrated A, B, C, D, E; gear and hub; two No. 6-32 set screws; Delco No. A-7254566.
38	O-105	1	DIAL ASSEMBLY, calibrated: tripler; 19/32" h x 1" dia overall; consisting of dial decal calibrated A, B, C, D, E; gear and hub; two No. 6-32 set screws; Delco No. A-7254570.
39	D-101	2	DYNAMOTOR; plate voltage supply; output 250 vdc, 60 ma; input 28 vdc, 1.1 amp; 4-1/2" lg x 2-3/4" dia; Delco No. C-7254437.
40	Z-101	2	FILTER, band pass, four channel; 475 cyc peak 221 to 255 cyc band width; 3000 cyc peak 1495 to 1605 cyc width; 755 cyc peak 351 to 405 cyc band width; 1900 cyc peak 884 to 1016 cyc band width; 3-1/4" h x 2-3/4" sq; Delco No. C-7254247.
41	H-101	2	GROMMET, rubber: fits 3/8" dia hole; 1/2" OD x 1/4" ID x 3/16" thk; Delco No. 1210716.
42	H-102	4	GROMMET, rubber: fits 1/2" hole; 5/8" OD x 25/64" ID x 1/4" thk; Delco No. 7237173.
43	E-108	1	GUARD, antenna lead: paper base bakelite; 7/8" lg x 11/32" wd x 3/32" thk; Delco No. 7254464.
44	E-110	1	INSULATOR, plate: rectangular; brown XXXP bakelite; 1-15/16" lg x 3/4" wd x 1/32" thk; Delco No. 7254378.
45	E-111	1	INSULATOR, plate: rectangular; brown XXXP bakelite; 1-3/8" lg x 3/8" wd x 1/32" thk; Delco No. 7254379.
46	E-112	1	INSULATOR, plate: rectangular; brown XXXP paper base bakelite; 7/8" lg x 3/4" wd x 1/32" thk; Delco No. 7254381.
47	E-113	1	INSULATOR, plate; rectangular; brown XXXP bakelite; 5/8" lg x 5/32" wd x 1/32" thk; Delco No. A-7254457.
48	E-109	1	INSULATOR, standoff; rectangular; .015 fiberglass cloth; 2-3/4" lg x 7/8" wd; two .218 mtg holes on 2.187" mtg/c; Delco No. A-7254580.
49	E-114	2	INSULATOR, washer: grade XXXP paper base bakelite; .120 ID x 1/4" OD; Delco No. A-7253487.
50	J-102	2	JACK, telephone: closed type; for 2-conductor 0.25" dia plug; 1-5/8" lg x 5/8" wd x 1" h overall; Mallory type A2A; Delco No. 7254524.
51	J-103	2	JACK, telephone: shorting type; for 2-conductor 0.25" dia plug; approx 1-1/4" lg x 1" wd x 3/4" h overall; Delco No. 7254363.
52	O-106	4	MOUNT, vibration: square 1-1/4" sq x 0.32" thk; Delco No. 7254552.
53	K-101, K-102	3	RELAY, balance: 2 windings; 24 v DC; 5-amp, 8000 ohms; 2-23/32" lg x 1-13/16" wd x 2-1/16" h overall; allied type DSX-3; Delco No. 7254365.

Item No.	*Reference Symbols*	*Quantity (See Notes)*	*Name of Part, Description and Equipment Contractor's Part Number, If Available*
54	R-102, R-108, R-131, R-134, R-145	8	RESISTOR, fixed; composition; 220 ohms ±10%; 1/2 watt; Delco No. B-7254178.
55	R-105	4	RESISTOR, fixed; composition; 1800 ohms ±10%; 1/2 watt; Delco No. B-7254180.
56	R-104	4	RESISTOR, fixed; composition; 2200 ohms ±10%; 1/2 watt; Delco No. B-7254181.
57	R-130	4	RESISTOR, fixed; composition; 2200 ohms ±10%; 1 watt; Delco No. A-7251736.
58	R-106, R-111, R-136	8	RESISTOR, fixed; composition; 3900 ohms ±10%; 1/2 watt; Delco No. B-7254182.
59			TO BE FURNISHED LATER.
60	R-119, R-122	6	RESISTOR, fixed; composition; 10,000 ohms ±10%; 1/2 watt; Delco No. B-7254184.
61	R-107	4	RESISTOR, fixed; composition; 10,000 ohms ±10%; 1 watt; Delco No. A-7250610.
62	R-103	4	RESISTOR, fixed; composition; 22,000 ohms ±10%; 1/2 watt; Delco No. B-7254193.
63	R-135	4	RESISTOR, fixed; composition; 39,000 ohms ±10%; 1/2 watt; Delco No. B-7254192.
64	R-124	4	RESISTOR, fixed; composition; 56,000 ohms ±10%; 1/2 watt; Delco No. B-7254187.
65	R-101, R-112, R-113, R-132, R-133, R-137	10	RESISTOR, fixed; composition; 68,000 ohms ±10%; 1/2 watt; Delco No. B-7254188.
66	R-110	4	RESISTOR, fixed; composition; 220,000 ohms ±10%; 1/2 watt; Delco No. B-7254189.
67	R-115, R-116	6	RESISTOR, fixed; composition; 170,000 ohms ±10%; 1/2 watt; Delco No. A-7249364.
68	R-117, R-118, R-120 thru R-123, R-126 thru R-129	10	RESISTOR, fixed; composition; 1 megohm ±10%; 1/2 watt; Delco No. B-7254191.
69	R-125	4	RESISTOR, fixed; composition; 4.7 megohm ±10%; 1/2 watt; Delco No. A-7248479.
70	R-139	4	RESISTOR, fixed; wirewound; 2 ohms ±5%; 7 watt; Delco No. B-7254197.
71	R-138	4	RESISTOR, fixed; wirewound; 40 ohms ±5%; 2 watt; Delco No. A-7254198.
72	R-140	4	RESISTOR, fixed; wirewound; 1600 ohms ±15%; 8 watt; Delco No. B-7254199.
72.1	R-141 thru R-144	5	RESISTOR, variable: 5000 ohms; .015 watt; 2 terminals; body 23/32" diam x 31/64" lg; shaft 1/4" diam x 21/64" lg; bushing 3/8"-32 x 1/4" lg; Delco No. 7254579.
73	R-109	2	RESISTOR, variable: carbon; 1 megohm; 1/4 watt; 3 terminals; body 15/16" diam x 29/64" thk; shaft 1/4" diam x 1/2" lg; 1-13/64" wd overall; "B" taper; Delco No. 7254164.
74	R-114	2	RESISTOR, variable: carbon; 1 megohm; 1/4 watt; 3 terminals; body 15/16" diam x 29/64" thk; shaft 1/4" diam x 1/2" lg; 1-13/64" wd overall; "D" taper; Delco No. 7254165.
75	H-103	6	SCREW, worm; brass rod, cadmium plated; 1/4"-20; 1-3/8" lg overall; 5/8" lg thd; head .2485/.2510 diam x 15/32" lg; Delco No. 7254216.
76	E-117	2	SHIELD, tube: steel; round, open top; bayonet type mtg; 13/16" diam x 1-3/4" lg inside dimensions; 1-3/4" h x .015" thk stock; Delco No. B-7253658.
77	E-118	1	SHIELD, tube; steel; round, open top; bayonet type mtg; 13/16" diam x 1-3/8" lg inside dimensions; 1-3/8" h x .015" thk stock; Delco No. B-7254471.
78	X-101	2	SOCKET, crystal: glazed ceramic; 1-3/8" lg x 15/32" wd x 7/8" thk overall; Delco No. A-7254243.
79	X-102	4	SOCKET, tube; miniature socket; steel shell with mica filled body; 1-9/32" lg x .805" diam overall; Delco No. 7253659.
80	X-103	5	SOCKET, tube: miniature socket; steel shell with ceramic body; 1-9/32" lg x .805" diam overall; Delco No. B-7253819.
80.1	E-116	1	SPRING, retainer: .025 beryllium copper; cadmium plated; to hold crystal in socket; Delco No. 7254522.
81	E-115	6	SPRING, retainer: .047 diam music wire; cadmium plated; a loop with a radius of 1/8" then another loop with a .093 diam, thus pinched together to make 1/32" min and .062" max opening at the end; Delco No. A-7254221.
82	S-101	2	SWITCH, rotary: 1 pole 3 position; single section; bakelite base; 1-7/16" lg x 1-21/64" wd x 3/32" thk; Delco No. A-7254442.
83	T-104	2	TRANSFORMER, AF: output; primary 1184 ohms; secondary 165 ohms; upright shielded case; 1" OD x 1.4" lg; Delco No. B-7254502.
84	T-101 thru T-103	4	TRANSFORMER, IF: shielded; 2-13/32" lg x .75" sq overall; 2 coils each 22 turns No. 36 SCE wirewound on .212 OD x 1-15/16" lg ceramic form; each coil iron core tuned; Delco No. 7254478.
85	H-104	2	WASHER, flat; bakelite; .166" ID x 7/15" OD x 1/16" thk; tropicalized; Delco No. A-1591240.

Item No.	*Reference Symbols*	*Quantity (See Notes)*	*Name of Part, Description and Equipment Contractor's Part Number, If Available*
86	H-105	6	WASHER, flat: steel, cadmium plated; .160″ ID x 3/8″ OD x .031″ thk; Delco No. A-7254296.
87	H-106	2	WASHER, flat: vellumoid; .150″ ID x 5/16″ OD x 1/32″ thk; tropicalized; Delco No. A-7248789.
88	H-107	4	WASHER, spacing; cold drawn steel, cadmium plated; 3/8″ OD x .152″ ID x 9/32″ thk; Delco No. A-7254390.
89	H-108	6	WASHER, spring; phospher bronze; .160″ ID x 5/16″ OD x .015″ thk; Delco No. A-7254295.

APPENDIX "A"
CROSS REFERENCE OF LIST ITEM NUMBERS AGAINST REFERENCE SYMBOLS
for
RADIO, RADAR AND ELECTRONICS SPARE PARTS LIST
for
RADIO RECEIVING SET AN/CRW-7

Reference Symbols	*Item No.*
C-101	25
C-102	23
C-103	24
C-104	25
C-105	26
C-106	22
C-107	8
C-108, C-109	14
C-110, C-111	11
C-112, C-113	8
C-114	16
C-115	17
C-118	16
C-119	17
C-122, C-123	16
C-124	17
C-126	10
C-128	13
C-129	16
C-130-A, C-130-B	21
C-131	15
C-132	18
C-133-A, C-133-B	20
C-134-A, C-134-B	20
C-135	13
C-136	16
C-137	17
C-138	9
C-139	8
C-140	15
C-141	16
C-142, C-143	17
C-144	8
C-145	15
C-146	19
C-148	16
C-149 thru C-156	12
C-157 thru C-162	16
D-101	39
E-101	7
E-102	6
E-103	5
E-104	4
E-105	3
E-106	2
E-107	1
E-108	43
E-109	48
E-110	44
E-111	45
E-112	46
E-113	47
E-114	49
E-115	81
E-116	80.1
E-117	76
E-118	77
H-101	41
H-102	42
H-103	75
H-104	85
H-105	86
H-106	87
H-107	88
H-108	89
J-101	33
J-102	50
J-103	51
K-101, K-102	53
L-101	27
L-102, L-102-B	28
L-103-A thru L-103-B	31
L-104 thru L-108	29
L-109	30
O-101	32
O-102	35
O-103	36
O-104	37
O-105	38
O-106	52
P-101	34
R-101	65
R-102	54
R-103	62
R-104	56
R-105	55
R-106	58
R-107	61
R-108	54
R-109	73
R-110	66
R-111	58
R-112, R-113	65
R-114	74
R-115, R-116	67
R-117, R-118	68
R-119	60
R-120 thru R-123	68
R-122	60
R-124	64
R-125	69
R-126 thru R-129	68
R-130	57
R-131	54
R-132, R-133	65
R-134	54
R-135	63
R-136	58
R-137	65
R-138	71
R-139	70
R-140	72
R-141 thru R-144	72.1
R-145	54
S-101	82
T-101 thru T-103	84
T-104	83
X-101	78
X-102	79
X-103	80
Z-101	40

APPENDIX "ARMY"
SECTION 1

CROSS REFERENCE OF SIGNAL CORPS STOCK NUMBERS AGAINST LIST ITEM NUMBERS

for

RADIO, RADAR AND ELECTRONICS SPARE PARTS LIST

for

RADIO RECEIVING SET AN/CRW-7

Item No.	*Signal Corps Stock Number*	*Item No.*	*Signal Corps Stock Number*
1	2Z9406.184	46	3G1838-14.11
2	2Z9401.94	47	3G1838-10.23
3	2Z9406.183	48	3G1821-44
4	2Z9406.185	49	3G1838-4.5
5	2Z9405.116	50	2Z5531.2
6	2Z9404.201	51	2Z5534
7	2Z9403.177	52	2Z8402-24
8	3D9005-46	53	2Z7589-116
9	3D9015-36	54	3RC20BF221K
10	3D9024-10	55	3RC20BF182K
11	3K2010132	56	3RC20BF222K
12	3D9300-41	57	3RC30BF222K
13	3D9320-1	58	3RC20BE392K
14	3DA1-149	59	To be furnished later
15	3DA1-157	60	3RC20BF103K
16	3DA10-325	61	3RC30BF103K
17	3DA3-93	62	3RC20BF223K
18	3DA10-324	63	3RC20BF393K
19	3DKB1-15	64	3RC20BF563K
20	3DA100-470	65	3RC20BF683K
21	3DA250-236	66	3RC20BF224K
22	3D9030V-18	67	3RC20BF474K
23	3D9034VE8	68	3RC20BF105K
24	3D9034VE8-1	69	3RC20BF475K
25	3D9049VE6-2	70	3Z5992-61
26	3D9049VE6-1	71	3Z6004-43
27	3C1084Z3-18	72	3Z6160-35
28	3C1084Z3-14	72.1	3Z7350-30
29-A	3C1084Z3-17	73	3Z7350-31
29-B	3C1084Z3-16	74	3Z7499-1.14
30	3C1084Z3-15	75	2Z4875-80
31	3C1084Z3-19	76	2Z8320-11
32	3G1837-8.19	77	2Z8320-10
33	2Z8680-5	78	2Z3063-48
34	2Z7120.3	79	2Z8677.94
35	2Z3723-27	80	2Z8677.95
36	2Z3719-42	80.1	2Z8877.100
37	2Z3714-85	81	2Z8877.99
38	2Z3719-41	82	3Z9826-70.1
39	3H1528-12	83	2Z9632.378
40	3Z1891-21.2	84	2Z9641.211
41	6Z4920-3	85	6LK40214
42	6Z4918-1	86	6L58023.1Z
43	3G1838-14.12	87	6L50522-26
44	3G1838-31.5	88	2Z1409-61
45	3C1838-22.6	89	6L73612-2

APPENDIX "ARMY"
SECTION 2

CROSS REFERENCE OF LIST NUMBERS AGAINST SIGNAL CORPS STOCK NUMBERS
for
RADIO, RADAR AND ELECTRONICS SPARE PARTS LIST
for
RADIO RECEIVING SET AN/CRW-7

Signal Corps Stock Number	*Item No.*	*Signal Corps Stock Number*	*Item No.*
2Z1409-61	88	3DA1-157	15
2Z3063-48	78	3DA3-93	17
2Z3714-85	37	3DA10-324	18
2Z3719-41	38	3DA10-325	16
2Z3719-42	36	3DA100-470	20
2Z3723-27	35	3DA250-236	21
2Z4875-80	75	3DKB1-15	19
2Z5531.2	50	3G1821-44	48
2Z5534	51	3G1837-8.19	32
2Z7120.3	34	3G1838-4.5	49
2Z7589-116	53	3G1838-10.23	47
2Z8320-10	77	3G1838-14.11	46
2Z8320-11	76	3G1838-14.12	43
2Z8402-24	52	3G1838-31.5	44
2Z8677.94	79	3H1528-12	39
2Z8677.95	80	3K2010132	11
2Z8680-5	33	3RC20BF103K	60
2Z8877.99	81	3RC20BF105K	68
2Z8877.100	80.1	3RC20BE182K	55
2Z9401.94	2	3RC20BF221K	54
2Z9403.177	7	3RC20BF222K	56
2Z9404.201	6	3RC20BF223K	62
2Z9405.116	5	3RC20BF224K	66
2Z9406.183	3	3RC20BE392K	58
2Z9406.184	1	3RC20BF393K	63
2Z9406.185	4	3RC20BF474K	67
2Z9641.211	84	3RC20BF475K	69
2Z9632.378	83	3RC20BF563K	64
3C1084Z3-14	28	3RC20BF683K	65
3C1084Z3-15	30	3RC30BF103K	61
3C1084Z3-16	29-B	3RC30BF222K	57
3C1084Z3-17	29-A	3Z1891-21.2	40
3C1084Z3-18	27	3Z5992-61	70
3C1084Z3-19	31	3Z6004-43	71
3C1838-22.6	45	3Z6160-35	72
3D9005-46	8	3Z7350-30	72.1
3D9015-36	9	3Z7350-31	73
3D9024-10	10	3Z7499-1.14	74
3D9030V-18	22	3Z9826-70.1	82
3D9034VE8	23	6LK40214	85
3D9034VE8-1	24	6L50522-26	87
3D9049VE6-1	26	6L58023.1Z	86
3D9049VE6-2	25	6L73612-2	89
3D9300-41	12	6Z4920-3	41
3D9320-1	13	6Z4918-1	42
3DA1-149	14		